FACT SHEET FOR NPDES PERMIT WA-002918-1

West Point Wastewater Treatment Plant (WWTP)
and
Combined Sewer Overflow (CSO) System

June 2009

PURPOSE of this Fact Sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for King County's West Point WWTP, CSO treatment plants, and associated CSO outfalls.

This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit *and accompanying fact sheet* for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for King County's West Point WWTP, NPDES permit WA-002918, were available for public review and comment from November 14, 2008, until December 15, 2008. For more details on preparing and filing comments about these documents, please see *Appendix A—Public Involvement Information*.

King County (County) reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, discharges, or receiving water.

After the public comment period closes, Ecology will summarize substantive comments and provide responses to them. Ecology will include the summary and responses to comments in this fact sheet as *Appendix H—Response to Comments,* and publish it when issuing the final NPDES permit. Ecology will not revise the rest of the fact sheet, but the full document will become part of the legal history contained in the facility's permit file.

Mark Henley, PE, municipal permit manager, prepared the permit and this fact sheet.

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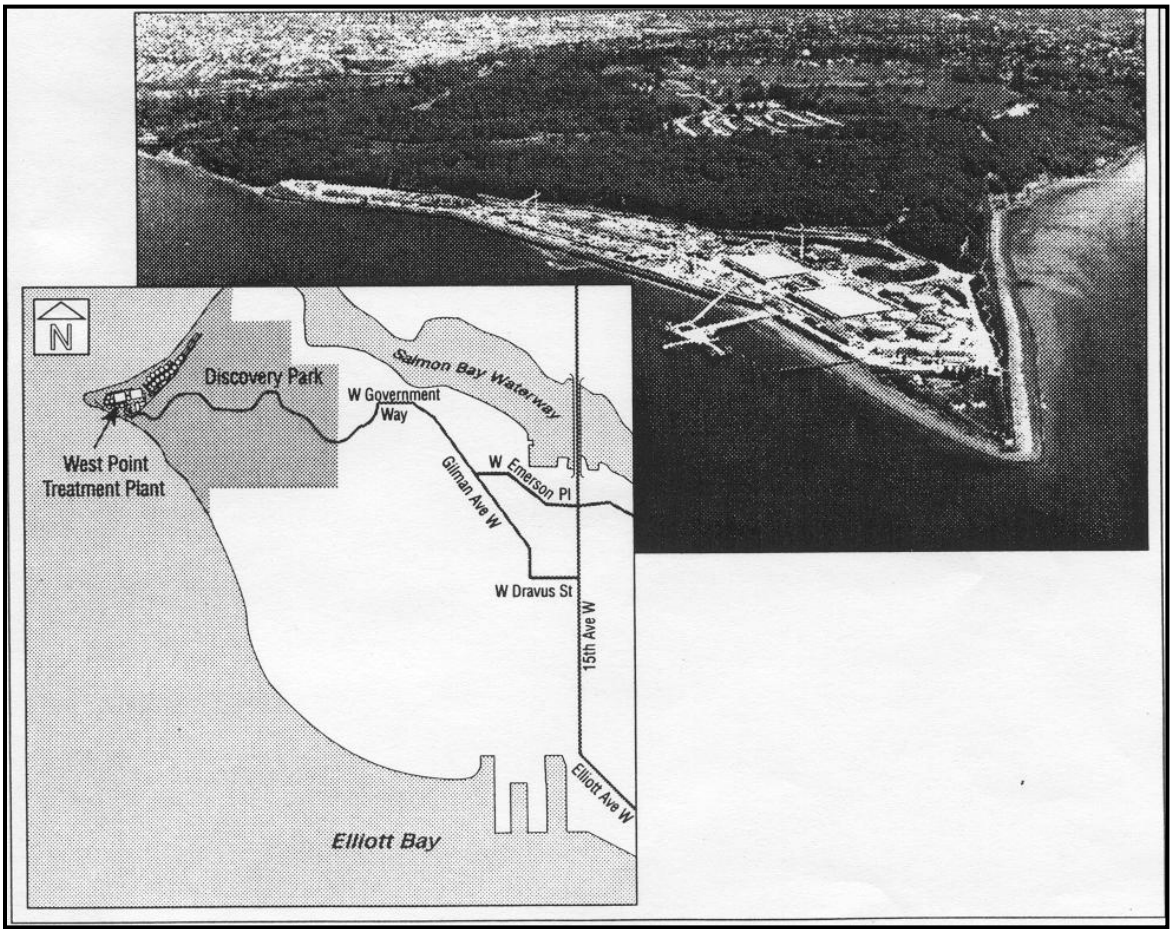

Figure 1. Vicinity Map for West Point Wastewater Treatment Plant

EXECUTIVE SUMMARY

Washington State rules require that the owner of a municipal wastewater treatment plant (WWTP) obtain a National Pollutant Discharge Elimination System (NPDES) permit prior to discharging wastewater or combined sewer overflows to State waters. Statutes, rules and guidance are used to establish the discharge limitation for pollutants and other permit requirements. Most NPDES permits are effective for five years and may be administratively extended.

King County's Wastewater Treatment Division owns and operates the West Point WWTP and combined sewer overflow (CSO) system. King County applied for the renewal of their NPDES permit for West Point WWTP and the CSO system on June 30, 2008. Ecology prepared a draft permit and accompanying fact sheet and made it available for public comment on November 14, 2008. In response to public comment, Ecology held an open house, informal public meeting, and formal public hearing on January 27, 2009. The public comment period was extended until February 13, 2009.

The below information describes major changes from the previous permit (January 1, 2004 to December 31, 2008) to the proposed renewed permit (July 1, 2009 to June 30, 2014).

Dilution Factors

Ecology thoroughly reviewed the County's data, dilution factors, and modeling in August 2008 and January 2009. There are differences between the dilution factors used in the previous permit and the dilution factors used in the proposed permit as described in the below table. Ecology verified that the County used conservative assumptions and provided rigorous modeling to obtain dilution factors. Ecology used the revised dilution factors due to: 1) new and improved computer models, 2) closer ambient monitoring stations to each outfall; and 3) more accurate effluent flow data. The dilution factors in the proposed permit are considered more up-to-date and representative than those used in the previous permit. Ecology notes that four of the dilution factors increased and four dilution factors decreased from the previous permit.

Outfall	Chronic Mixing Zone (feet)	Zone of Acute Criteria Exceedance (feet)	Proposed Chronic Dilution Ratio	Current Chronic Dilution Ratio	Proposed Acute Dilution Ratio	Current Acute Dilution Ratio
West Point WWTP	430 (131 m)	43 (13.1m)	181:1	153:1	28:1	32:1
Alki CSO	340 (104 m)	34 (10.4 m)	61:1	120:1	17.5:1	20:1
Carkeek CSO	395 (120 m)	39.5 (12.0 m)	146:1	197:1	93:1	38:1
Elliott West CSO	260 (79 m)	26 (7.9 m)	11:1	7.2:1	7.8:1	3.4:1
MLK/ Henderson CSO	312 (95 m)	31.2 (9.5 m)	10.3:1	10.3:1	1.9:1	1.9:1

Effluent Limits

The following tables, at each facility, compare the effluent limits from the previous permit to this final permit. Changes in limits are due to either revised dilution factors or incorporation of technology/guidance-based limits. For more specific information, please refer to the fact sheet. New pH limits have been included for CSO treated discharges.

Comparison of Effluent Limits (West Point WWTP)

Parameter	Basis of Limit	Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
		Average Monthly	Average Weekly	Average Monthly	Average Weekly
Carbonaceous Biochemical Oxygen Demand (5-day)	Technology	25 mg/L, 44,800 lb/day	40 mg/L, 71,700 lb/day	25 mg/L, 44,800 lb/day	40 mg/L, 71,700 lb/day
Total Suspended Solids	Technology	30 mg/L, 53,800 lb/day	45 mg/L, 80,700 lb/day	30 mg/L, 53,800 lb/day	45 mg/L, 80,700 lb/day
Fecal Coliform Bacteria	Technology	200/100 mL	400/100 mL	200/100 mL	400/100 mL
pH	Technology	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0	
Parameter	**Basis of Limit**	**Previous Effluent Limits: Outfall # 001**		**Proposed Effluent Limits: Outfall # 001**	
		Average Monthly	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Total Residual Chlorine	Water Quality-Based	160 µg/L (285 lb/day)	420 µg/L	139 µg/L	364 µg/L

Comparison of Effluent Limits (Alki CSO Treatment Plant)

Previous Effluent Limits: Outfall # 051				Proposed Effluent Limits: Outfall # 051		
Parameter	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**
Total Suspended Solids Removal Efficiency, %	NA	50%	NA	NA	50%	NA
Settleable Solids (mL/L/hr)	1.9 Maximum	0.3	NA	1.9 Maximum	0.3	NA
Fecal Coliform Bacteria	1,700/100mL	NA	NA	400/100mL	NA	NA
Number of events per year	NA	NA	29/yr	NA	NA	29/yr
Average Vol. per yr, MG	NA	NA	108 MG/yr	NA	NA	108 MG/yr
pH	NA	NA	NA	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		
Parameter	**Average Monthly**		**Maximum Daily Averages**	**Average Monthly**		**Maximum Daily Averages**
Total Residual Chlorine	NA		290 µg/L	NA		234 µg/L

Comparison of Effluent Limits (Carkeek CSO Treatment Plant)

Previous Effluent Limits: Outfall # 046				Proposed Effluent Limits: Outfall # 046		
Parameter	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**
Total Suspended Solids Removal Efficiency, %	NA	50%	NA	NA	50%	NA
Settleable Solids (mL/L/hr)	1.9 Maximum	0.3	NA	1.9 Maximum	0.3	NA
Fecal Coliform Bacteria	2,800/100mL	NA	NA	400/100mL	NA	NA
Number of events per year	NA	NA	10/yr	NA	NA	10/yr
Average Vol. per yr, MG	NA	NA	46 MG/yr	NA	NA	46 MG/yr
pH	NA	NA	NA	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		
Parameter	**Average Monthly**		**Maximum Daily Averages**	**Average Monthly**		**Maximum Daily Averages**
Total Residual Chlorine	NA		490 µg/L	NA		490 µg/L

Comparison of Effluent Limits (Elliott West CSO Treatment Plant)

Previous Effluent Limits: Outfall # 027				Proposed Effluent Limits: Outfall # 027		
Parameter	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**
Total Suspended Solids Removal Efficiency, %	Report	50%	NA	Report	50%	NA
Settleable Solids (mL/L/hr)	1.9 Maximum	0.3	NA	1.9 Maximum	0.3	NA
Fecal Coliform Bacteria	400/100mL	NA	NA	Interim 400/100 mL Final 154/100 mL	NA	NA
Number of events per year	Report	Report	NA	Report	Report	NA
Average Vol. per yr, MG	Report	Report	NA	Report	Report	NA
pH	NA	NA	NA	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		
Parameter	**Average Monthly**		**Maximum Daily Averages**	**Average Monthly**		**Maximum Daily Averages**
Total Residual Chlorine	NA		44 µg/L	NA		104 µg/L
Copper	NA		NA	Monitor		

Comparison of Effluent Limits (MLK/Henderson Treatment Plant)

Previous Effluent Limits: Outfall # 044				Proposed Effluent Limits: Outfall # 044		
Parameter	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**
Total Suspended Solids Removal Efficiency, %	Report	50%	NA	NA	50%	NA
Settleable Solids (mL/L/hr)	1.9 Maximum	0.3	NA	1.9 Maximum	0.3	NA
Fecal Coliform Bacteria	400/100mL	Report	NA	400/100 mL	Report	NA
Number of events per year	Report	Report	NA	NA	Report	NA
Average Vol. per yr, MG	Report	Report	NA	NA	Report	NA
pH	NA	NA	NA	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		
Parameter	**Average Monthly**		**Maximum Daily Averages**	**Average Monthly**		**Maximum Daily Averages**
Total Residual Chlorine	NA		39 µg/L	NA		39 µg/L

West Point WWTP's Disinfection System

Due to operational and maintenance problems at West Point's disinfection system, Ecology is requiring that a disinfection evaluation be performed. Permit Condition S10 requires the evaluation of various options to be considered in light of compliance, reliability, safety, economics, and ease of operation and maintenance. S10 requires that the evaluation include the selection of a preferred alternative and an implementation schedule.

Sediment Monitoring

The proposed permit requires King County to test more extensively for sediment toxicity in the vicinity of the West Point outfall than the previous permit. In addition, a comprehensive report regarding sediments at all CSO outfalls is required.

New Requirements for CSO System

A new compliance scheduled is included in this permit for the County's four CSO Beaches projects. A post-construction compliance monitoring plan for controlled CSO outfalls is required. Reporting of CSO discharge events, duration and volume has increased from annually to monthly.

Priority Pollutant Testing

The previous permit included priority pollutant sampling once per year for the West Point WWTP effluent. This permit includes priority pollutant sampling twice per year and includes sampling when flows are being diverted around the secondary process (i.e. instantaneous effluent flow is greater than 300 MGD) or when the average daily precipitation is equal to or greater than 0.25 inches. This new requirement is intended to better characterize the effluent quality during major storm events.

The previous permit required priority pollutant sampling once during the permit cycle for the Alki and Carkeek CSO treatment plants. This permit requires annual priority pollutant sampling or five times per permit cycle. Due to missed priority pollutant sampling during the previous permit, additional priority pollutant work is required at the MLK/Henderson CSO treatment plant and includes priority pollutant sampling during the first four discharge events in addition to annual sampling requirements. For the Elliott West CSO treatment plant, copper sampling is required four times per year in order to better characterize this pollutant in the discharge.

I. INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the State of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The legislature defined Ecology's authority and obligations for the wastewater discharge permit program in 90.48 RCW (Revised Code of Washington).

The following regulations apply to municipal NPDES permits:

- Procedures Ecology follows for issuing NPDES permits (Chapter 173-220 WAC).
- Technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC).
- Water quality criteria for surface waters (Chapter 173-201A WAC) and for ground waters (Chapter 173-200 WAC).
- Sediment management standards (Chapter 173-204 WAC).
- Submission of Plans and Reports for Construction of Wastewater Facilities (Chapter 173-240 WAC).

These rules require any treatment facility operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days (WAC 173-220-050). (See *Appendix A—Public Involvement Information* for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft NPDES permit. Ecology will summarize the responses to comments and any changes to the permit in *Appendix H—Response to Comments.*

II. BACKGROUND INFORMATION

Table 1. General Facilities Information

Applicant:	**King County Wastewater Treatment Division**
Facility Names and Addresses:	West Point Wastewater Treatment Plant (WWTP) 1400 Utah Street West Seattle, WA 98199 Alki Storage and CSO Treatment Plant 3380 Beach Drive SW Seattle, WA 98116-2616 Carkeek Storage and CSO Treatment Plant 1201 NW Carkeek Park Road Seattle, WA 98177-4640 Denny/Elliott West Storage and CSO Treatment Plant 545 Elliott Avenue West Seattle, WA 98119 MLK/Henderson Storage and CSO Treatment Plant 9829 42nd Avenue South Seattle, WA 98118
Type of Treatment:	West Point WWTP: Secondary (High-rate oxygenated activated sludge) Alki, Carkeek, Denny/Elliott West, and MLK/Henderson CSO Treatment Plants: Primary with Disinfection
Discharge Locations:	**Puget Sound**: West Point: Latitude: 47º 39' 38.8" N Longitude: -122º 26' 55.1" W Alki CSO Treatment Plant: Latitude: 47º 34' 12.9" N Longitude: -122º 25' 21.0" W Carkeek CSO Treatment Plant: Latitude: 47º 42' 45.5" N Longitude: -122º 23' 16.4" W **Elliott Bay:** Elliott West CSO Storage & Treatment Facility: Latitude: 47º 37' 3.18" N Longitude: -122º 21' 42.68" W **Duwamish River:** Henderson/MLK CSO Storage & Treatment Facility: Latitude: 47º 30' 42.98" N Longitude: -122º 17' 50.48" W

Figure 2. Map of West Point WWTP and CSO System

A. Facility Description

History

The West Point Wastewater Treatment Plant (West Point WWTP) was first constructed in 1965 as a primary treatment plant. In 1972, the amended Federal Water Pollution Control Act (PL 92-500) established the National Pollutant Discharge Elimination System (NPDES) and pretreatment programs. Federal law provided that all sewage treatment plants were to meet secondary treatment requirements by July 1, 1977. During the period 1976-1977, METRO (Municipality of Metropolitan Seattle) the agency having ownership of the plant at the time, prepared a draft facility plan and Environmental Impact Statement (EIS) and submitted a request for federal funding through EPA Grant No. C0530816-01 to meet secondary treatment requirements at West Point. In 1979, METRO applied to the USEPA for a Clean Water Act Section 301(h) Waiver from secondary treatment at West Point, Richmond Beach, and Carkeek. METRO also planned to apply for a waiver for the Alki treatment plant. METRO withdrew from the 301(h) waiver process on September 7, 1984, which resolved this process. On September 24, 1984, Ecology issued METRO an Administrative Order, Docket No. DE 84-577. The Order directed METRO to proceed with planning for secondary treatment at West Point and set a schedule for attaining secondary treatment no later than February 1, 1991. In November 1987, Ecology amended the Order by Consent Decree No. 87-2-05395-4 changing, among other things, the final compliance date to December 31, 1995. On January 1, 1994, King County assumed control of Metro's assets and obligations under the existing NPDES permits issued by the Ecology.

On December 8, 1995, Ecology certified that the West Point WWTP achieved the secondary treatment level.

Background

West Point WWTP

King County's Wastewater Treatment Division owns and operates the West Point WWTP and associated regional facilities. The West Point WWTP is part of King County's regional system that collects and treats wastewater from homes, businesses, and industries surrounding the Lake Washington area. King County's other major wastewater treatment plants include South Plant (Renton) and Brightwater (outside of Woodinville – currently under construction).

King County provides wholesale wastewater treatment services to 17 cities, 16 local sewer utilities, and one Indian tribe. The county's Wastewater Treatment Division (WTD) serves about 1.4 million people within a 420-square-mile service area, which includes most urban areas of King County and parts of south Snohomish County and northeast Pierce County. The local agencies own and operate independent collection systems, which include pipelines and pump stations to collect and convey wastewater flows in their service area to King County's regional system for treatment and disposal. The local agencies have long-term agreements with King County for this service. King County owns and operates the regional treatment plants, pipelines, pump stations, and other related facilities. The following is a list of the municipalities, sewer districts, and water districts that contribute wastewater to this facility: Bothell, Brier, Lake Forest Park,

Redmond, Seattle, Woodway, Alderwood Water District, Highlands Sewer District, North Shore Utilities, NE Sammamish Sewer & Water District, Valley View, Ronald Wastewater District, Sammamish Plateau Sewer & Water District, Skyway Water & Sewer District, and Olympic Water & Sewer District.

In addition to the domestic and commercial wastewater, nearly all of Seattle's industrial areas discharge to the West Point WWTP. Sixty-four industrial users discharge industrial flows to the West Point system. In year 2007, West Point received an estimated daily flow of 0.86 MGD from industrial sources. King County noted this flow represented approximately 0.88% of the flow to West Point during year 2007.

King County projects the population served by West Point WWTP to increase from a 2008 population of 1,337,000 to approximately 1,362,000 by 2010. The population projections take into account planned changes in apportionment of flows between the West Point WWTP and the South Treatment Plant. The County expects Brightwater to come online in early 2011 thereby, reducing the population served by West Point WWTP in years 2011 and 2013. The following table presents a summary of the flow, BOD, and TSS projections, as described in the NPDES permit application.

Table 2. Summary of West Point WWTP's Flow, BOD, and TSS Projections

Year	Population	Average Annual Flow (MGD)	Influent BOD Loading (pounds)	Influent TSS Loading (pound)
2007	1,325,000	98.1[1]	144,400[1]	158,600[1]
2008	1,337,000	111	157,800	178,700
2010	1,362,000	110	160,000	180,900
2011	1,199,000	96	136,800	161,500
2013	1,217,000	97	138,500	163,100
Design		142	168,000	181,000
Note: [1] = Flow, BOD loading, and TSS loading are actual 2007 figures.				

The West Point WWTP is located on the Puget Sound at the western tip of Discovery Park between Shilshole Bay and Elliott Bay. King County owns approximately 80 acres of land at the West Point site. Twenty acres of this land is subtidal. The current facilities are located on approximately 25 acres of land. The West Point WWTP serves mostly a combined sewer system area and therefore this NPDES permit contains additional permit requirements related specifically to combined sewer systems. Currently, the West Point WWTP can provide secondary treatment for flows up to 300 MGD and provides primary treatment and disinfection for flows exceeding 300 MGD. The plants hydraulic capacity is 440 MGD. On December 2, 3, and 4, 2007, instantaneous peak flows as high as 465 MGD, 487 MGD, and 383 MGD, respectively, were conveyed through the WWTP. The West Point WWTP is rated as a Class IV treatment plant, according to regulation.

The current permit authorizes discharges from the West Point WWTP, four CSO storage and treatment facilities (Alki, Carkeek, Elliott West, and Henderson/MLK), and 38 individual CSO outfalls.

King County is currently constructing a 51-million-gallon per day (maximum monthly flow) secondary treatment plant, named Brightwater, in south Snohomish County by 2011. Upon completion, King County will reroute wastewater from north of Lake Washington, including Bothell, Lynnwood, and parts of Snohomish County that are currently routed to the West Point WWTP and some flows on the east side that are conveyed to South Plant, to the Brightwater Plant. West Point WWTP will primarily serve the city of Seattle.

Alki CSO Treatment Plant

METRO constructed the Alki treatment plant in 1958 as a primary treatment plant to serve the Alki Basin, an area of 4,095 acres. It is located in West Seattle at the intersection of Beach Drive and Benton Place on 2.8 acres. The service area is largely residential with a projected saturation population of 43,700. Commercial activity is concentrated along portions of California Avenue and SW Alaska Street. METRO overhauled the plant in 1987 by architectural enclosure of facilities and retrofit of mechanical and electrical systems. In 1998, the plant was remodeled to operate as a near-fully automated CSO treatment plant. Related projects included the construction of the West Seattle Pump Station, the West Seattle Tunnel, and other flow transfer pipelines. On October 25, 1999, Ecology incorporated the Alki treatment plant into the West Point WWTP NPDES Permit. Prior to 1999, the plant operated under NPDES Permit No. WA-002901-7.

The County transfers incoming flows less than 18.9 MGD to the West Point WWTP for secondary treatment. The Alki/West Seattle tunnel system stores 7.1 MG of combined sewage. Flows above 18.9 MGD and above the 7.1 million gallons stored in the West Seattle Tunnel, up to a maximum of 65 MGD, receive primary treatment and disinfection at the Alki plant with discharge via an outfall to Puget Sound. To protect the Alki plant, King County discharges flows in excess of 65 MGD via the 63rd Avenue Pump Station outfall, a permitted CSO location.

Carkeek CSO Treatment Plant

METRO constructed the Carkeek treatment plant in 1962 as a primary treatment plant to serve the Carkeek Basin. It is located at 1201 NW Carkeek Park Road. In 1994, a pumping station was constructed and the plant was converted to a CSO treatment facility. METRO placed it into service as a CSO treatment facility on November 1, 1994, under its then-existing NPDES Carkeek permit, WA-002917-3. The current West Point permit includes permit limits for the Carkeek CSO treatment plant.

During normal operation (pump station only), the West Point off-site crew services the pump station and CSO treatment plant three times a week. During a storm, West Point off-site operators staff the plant during start up, shut down, preventative maintenance, and operational checks.

Elliot West CSO Treatment Facilities

King County submitted a request for permit modification on March 25, 2004, for the addition of the Elliott West CSO storage and treatment facility to the West Point Wastewater Treatment Plant NPDES Permit. The Elliott West CSO treatment plant is part of the Denny Way/Lake Union CSO Control project. The Denny Way/Lake Union CSO Control project

consisted of the construction of several CSO facilities to store and treat CSOs from the County's Dexter Regulator and City of Seattle CSOs around Lake Union, and to control the County's largest CSO at Denny Regulator on Elliott Bay. King County completed construction of the project in May 2005. It consisted of four major elements: the East Portal, which captures flow from a number of sewer lines in the South Lake Union area; the 14-foot-diameter Mercer Street Storage and Treatment Tunnel; and the Elliott West CSO treatment facility located on Elliott Bay; and the transition and dechlorination facilities adjacent to the Denny Way regulator station. Two new CSO outfalls were built in Elliott Bay—one outfall to replace the outfall structure at the Denny Way Regulator and another outfall for the Elliott West CSO treatment facility. The Mercer Tunnel provides storage for up to 7.2 MG and primary clarification for all flows entering the tunnel. The County designed the Elliott West treatment facility to provide final treatment (screening, disinfection, and dechlorination) to settled flows that exceed the capacity of the tunnel. After storm events, the tunnel is emptied by pumping these stored flows to West Point WWTP.

Henderson/MLK CSO Facilities

King County submitted a request for permit modification on April 26, 2004, for the addition of the Henderson/MLK CSO storage and treatment facility to the West Point Wastewater Treatment Plant NPDES Permit. The Henderson/Norfolk CSO control project was implemented to control the Henderson and Martin Luther King (MLK) CSOs into Lake Washington and the Norfolk CSO into the Duwamish River. King County upgraded the Henderson Pump Station and constructed a large storage and treatment tunnel between Henderson Street and Norfolk Street in the Rainier Valley. The facilities were designed to chlorinate and dechlorinate flows that exceed the capacity of the storage and treatment tunnel and to discharge treated flows at the Norfolk CSO in the Duwamish Waterway. Base flows, settled solids, and stored flows from the tunnel are conveyed to the South Plant at Renton or to the West Point WWTP, depending on capacity in the Elliot Bay Interceptor, for secondary treatment.

Collection System Status

The King County wastewater service area is divided into the East Section and the West Section. Wastewater from the East Section is conveyed to the South Treatment Plant; the West Section wastewater goes to the West Point WWTP. The West Section service area includes areas north and west of Lake Washington and the City of Seattle. Developments within the north Lake Washington area were constructed with separate sanitary and storm sewers. Within the City of Seattle, approximately 42,000 acres or 75 percent of the total area is constructed with combined sewers. Sanitary and combined flows from Seattle are merged prior to arriving at the West Point WWTP.

West Point WWTP receives wastewater from the west division collection system, a series of pump and regulator stations and related trunks and interceptors. Sewage flows by gravity via two influent tunnels (Ft. Lawton 144" Diameter and the Old Ft. Lawton Tunnel 84" Diameter) and enters the WWTP site at the influent control structure. The County's supervisory control and data acquisition **(**SCADA) computer systems automatically monitor and control the flow through the west division collection system. The control system minimizes surges, maximizes flow to the plant, and maximizes use of collection system storage to limit combined sewer overflows.

Combined Sewer Overflows

King County has 38 combined sewer overflow outfalls which discharge untreated sewage and stormwater during periods of heavy precipitation, within the city of Seattle. The collection system, as configured in 1983, discharged nearly 2.3 billion gallons per year of untreated sewage and stormwater from a total of 431 overflow events. Since 1988, the Metro/County has completed a number of projects to reduce the volume and frequency of CSOs. Based on data from 2000-2007, King County's average annual untreated CSO volume has been approximately 665.5 million gallons per year.

The previous permit required a CSO public notification study. King County fulfilled this requirement and implemented a real-time, web-based notification system. The below figure is taken from the County's webpage (http://www.kingcounty.gov/environment/wastewater/CSO/RealTime/SeattleOverview.aspx) that indicates the discharge status of every County-owned CSO outfall.

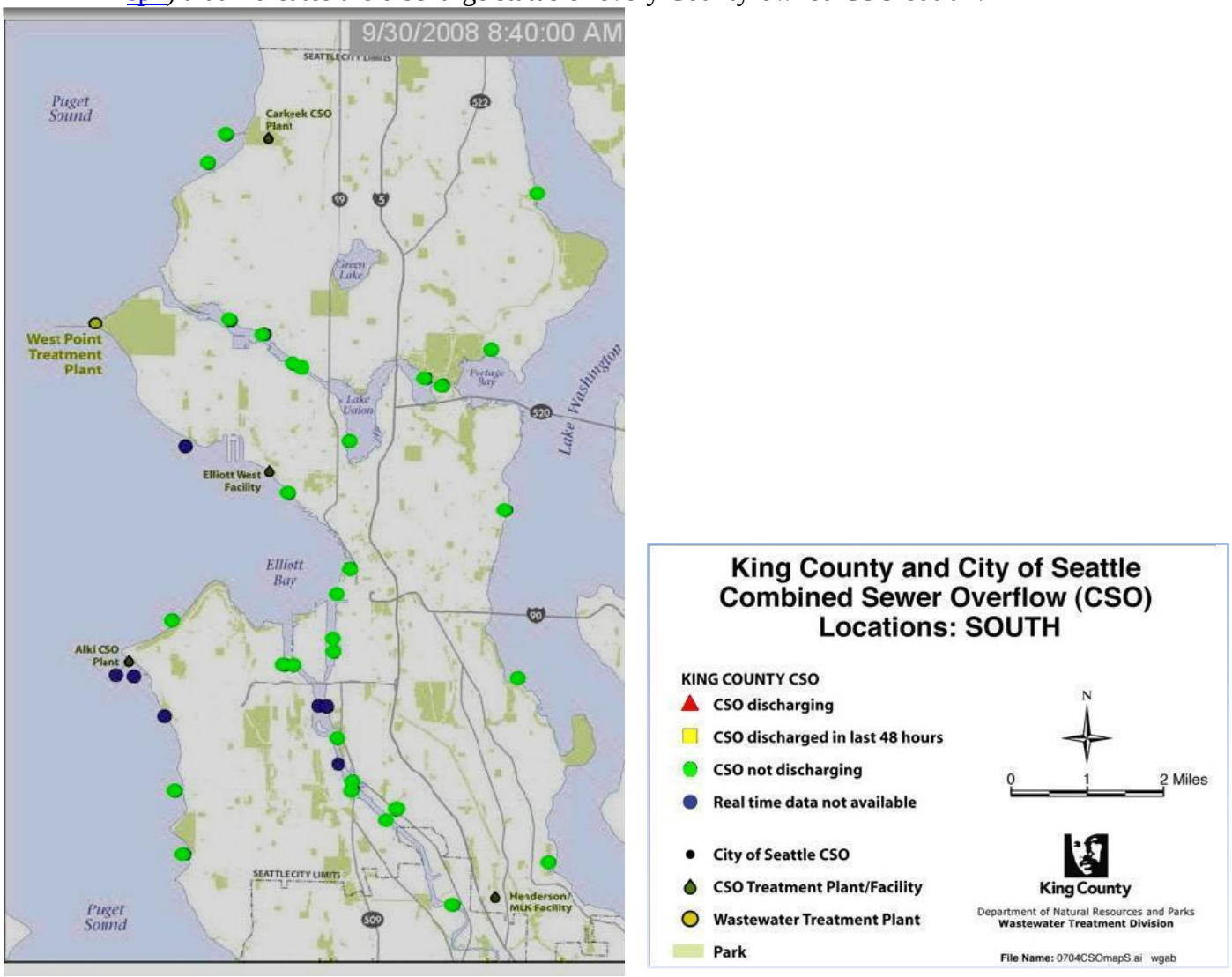

Figure 3. West Point WWTP, CSO Treatment Plants, and CSO Outfall Locations

In November 1999, the Metropolitan King County Council adopted the Regional Wastewater Services Plan, a supplement to the King County Comprehensive Water Pollution Abatement Plan (Ordinance 13680). The plan includes over 20 CSO control projects to reduce CSOs to one untreated event per year on average at each CSO location to be completed by 2030. Between 1995 and 2005, King County undertook the Elliott West and MLK/Henderson projects, in addition to other CSO projects, to reduce overflows from CSO locations. In addition, the plan identified priority projects at locations near beach areas. Consequently, there are four CSO control projects underway near beach areas, including the South Magnolia, North Beach, Barton Street, and Murray Avenue Projects. In 2006, the formal planning and predesign phase of the projects began. The County developed initial alternative screening criteria which it will refine based on community feedback. It will conduct flow monitoring in the local Seattle sewer system in each of the four basins to assess whether removing stormwater from these sewers is a viable option for CSO control. King County will explore the use of a low-impact development strategy (green infrastructure) as an alternative for CSO control in one of the basins. It will identify the most suitable basin in cooperation with the city of Seattle, and assess the feasibility and costs of the strategy. Predesign will continue through 2009 and end with issuance of facility plans in 2010. Final plans and specifications must be submitted by December 31, 2012, and construction must be initiated by December 31, 2013. The following table is an outline of future CSO control projects as presented in the 2008 CSO Control Plan Update.

Table 3. Future CSO Projects

Project Name	Project Description	Projected Year of Control	Water Body
University/Montlake	7.5 MG (million gallon) storage tank	2015	Lake Union/ East Ship Canal
Hanford #2	3.3 MG storage/treatment tank	2017	Duwamish River
West Point WWTP Improvements	Primary/secondary enhancements	2018	Puget Sound
Lander Street	1.5 MG storage/treatment at Hanford	2019	Duwamish River
Michigan	2.2 MG storage/treatment tank	2022	Duwamish River
Brandon Street	0.8 MG storage/treatment tank	2022	Duwamish River
Chelan Avenue	4 MG storage tank	2024	Duwamish River
Connecticut Street (now called Kingdome)	2.1 MG storage/treatment tank	2026	Elliott Bay
King Street	Conveyance to Connecticut Street treatment	2026	Elliott Bay
Hanford at Rainier Ave.	0.6 MG storage tank	2026	Duwamish River
8th Avenue S	1.0 MG storage tank	2027	Duwamish River
West Michigan	Conveyance upgrade	2027	Duwamish River
Terminal 115	0.5 MG storage tank	2027	Duwamish River
3rd Avenue W	5.5 MG storage tank	2029	West Ship Canal
Ballard [a]	1.0 MG storage tank (40% King County)	2029	West Ship Canal
11th Avenue W [b]	2.0 MG storage tank	2030	West Ship Canal

[a] A CSO control project may not be needed at the Ballard Regulator Station because this location may be controlled as the result of replacing the Ballard Siphon, scheduled for completion in 2010.

[b] The scope of the control project at 11th Avenue West may be reduced as a result of replacing the Ballard Siphon.

Inflow and Infiltration

King County created a Regional Infiltration and Inflow (I/I) Control Program in 1999 as part of the Regional Wastewater Services Plan (RWSP) to explore the feasibility of regional I/I control. The purpose of the program is to reduce the amount of peak wet weather flow entering the County's wastewater conveyance system when it is cost-effective to do so. Reduction of I/I in the system may prevent sanitary sewer overflows and decrease the costs of conveying and treating extraneous flows.

In response to the RWSP I/I Control Program policies, County staff, working in a consensus-based approach with the local sewer agencies, conducted a comprehensive 6-year, $41 million, I/I control study. The study began in 2000 and culminated with the County Executives recommendation for a regional I/I control program. The following work was completed as part of this study:

- Defined current levels of I/I for each local agency tributary to the regional system through extensive flow monitoring and modeling program (2001-2002).
- Selected and constructed 10 pilot projects in 12 local agency jurisdictions to demonstrate the effectiveness of collection system rehabilitation projects and to test various technologies and gain cost information (2003-2004).
- Developed final draft model standards, procedures, policies, and guidelines for use by local agencies to reduce I/I in their systems. These will remain draft pending completion of the recommended initial projects (October 2004).
- Completed a thorough benefit-cost analysis to determine the cost-effectiveness of I/I reduction (November 2005).
- Developed a long-term regional I/I control plan, approved by the King County Council (May 2006).
- In 2007-2008, King County began working with the local sewer agencies to conduct an I/I reduction feasibility analysis in order to select and implement 2-3 initial I/I reduction projects.

Future I/I work involves the following:

- Select and implement 2-3 initial I/I reduction projects in 2010-2012 to test the cost-effectiveness of I/I reduction on a scale large enough to potentially offset the need for larger conveyance or storage facilities. The County will determine details about these projects during the predesign and design phases in 2008-2009.
- Analyze the results of these initial projects and make recommendations to the King County Council regarding long-term I/I reduction and control, including applicable changes to policy or code.

After 2013, the County will continue implementing their regional I/I control program.

Treatment Processes

West Point WWTP

The West Point WWTP is a 215-million-gallon per day (maximum month design flow) high rate oxygen activated sludge secondary plant. METRO designed the plant to provide secondary treatment of flows up to 300 MGD. The liquid treatment process includes screening, grit removal, primary clarification, biological treatment using high rate oxygenated activated sludge, secondary clarification, chlorine disinfection, and dechlorination. The disinfected effluent discharges to Puget Sound through a multi-port diffuser located about 3,600 feet offshore at a depth of about 240 feet below mean lower low water. For flows above 300 MGD and up to 440 MGD, the treatment process consists of screening, de-gritting, primary sedimentation in clarifiers, disinfection with chlorine in a chlorine contact channel, and dechlorination. As for solids treatment, the primary and waste activated solids are blended in a tank and co-thickened via gravity belt thickeners. The thickened sludge is anaerobically digested, and dewatered by centrifuges. The plant produces biosolids used in agriculture and forestry, reclaimed water used for in-plant processes and irrigation, and methane that fuels the raw sewage pump engines, power generation system, and supplies heat at the plant. Presented in Appendix E is a schematic of the treatment process.

At the time of this permit issuance, 64 permitted industrial users discharge wastewater to the West Point WWTP (Appendix I). The number of significant industrial users and categorical industrial users is 33 and 31, respectively. The following table summarizes the waste stream characteristics of these users. Note: Some industries have more than one type of waste stream characterization.

Table 4. Waste Stream Characteristics

Waste Stream Characteristics	Number of Dischargers
pH (acid/caustic) wastewater	36
Metal-bearing wastewater	32
Fats, Oil, Grease – non polar	21

The West Point WWTP is rated as a Class IV plant. At the West Point WWTP, employees work in operations, maintenance, facilities, process control, laboratory analysis, and administration on a daily basis. The West Section also employs off-site operations and maintenance personnel. The section consists of 156 FTEs in total and there are generally 10 to 15 vacancies at any given time. Operations staff consists of about 70 employees, where 21 employees have Group IV certifications, 21 have Group III certifications, 13 have Group II certifications, and 11 have Group I certifications. Several new staff have Operator-in-Training certifications. The remaining staff have maintenance, facilities, process control, laboratory and administrative support functions at the plant or off-site.

Wet Weather Operation

The West Point WWTP serves a combined sewer service area. The secondary treatment units at West Point are designed to treat flows up to 300 MGD. During severe wet weather conditions, flows to the treatment plant above 300 MGD (instantaneous) and up to 440 MGD are given primary treatment and are then bypassed around the secondary treatment process through the plant's secondary diversion pipeline. The diverted flow is then blended together with the secondary treated flows prior to disinfection before discharged from the plant. EPA's 1994 Combined Sewer Overflow Control Policy allows for "CSO-related bypass" whereby, under certain conditions, the permit writer may allow wet weather flows to bypass secondary treatment.[1]

When Ecology approved the original facility plan, it was with the understanding that the West Point WWTP would operate in this manner. This is considered to be good engineering practice and an acceptable solution for treating a significant portion of the combined sewer overflow volume which occurs in the system during periods of rainfall. The West Point WWTP has been operating in this manner since 1995 when the secondary plant was constructed.

EPA's *Combined Sewer Overflow Guidance for Permit Writers* states that a "CSO-related bypass" at a wastewater treatment plant can only occur if there is no feasible alternative. The no feasible alternative can be met if the record demonstrates that the secondary treatment system is properly operated and maintained, that the system has been designed to meet secondary limits for flows greater than the peak dry weather flow plus an appropriate wet weather flow, and that it is either technically or financially infeasible to provide secondary treatment for greater amounts of flow.

Recent Class I and Class II inspections by Ecology found the West Point WWTP to be well operated and maintained. The design criteria for West Point includes an average dry weather flow and an average wet weather flow (during non-storms) of 110 MGD and 133 MGD, respectively. The design criteria for maximum month is 215 MGD. The West Point WWTP has been designed to meet secondary limits for flows greater than the peak dry weather flow plus an appropriate wet weather flow. West Point is able to treat flows up to 300 MGD through the secondary process. With the CSO-related bypass process, the West Point effluent meets, and is required to meet, secondary effluent limits at all times. During the West Point WWTP facility planning process, it was deemed infeasible to treat the peak wet weather from a combined system through the secondary process. There were concerns that flows from a combined system would wash out the biology in the secondary process. There is no separate designated combined sewer overflow outfall at the West Point WWTP site.

Alki CSO Treatment Plant

The Alki CSO treatment plant operates intermittently, only when flows in the Alki service area exceed 18.9 MGD or when the storage in the tunnel has been filled. The 18.9-MGD base flow is transferred directly to the West Point WWTP for secondary treatment without entering the Alki plant. The County diverts wet weather flows in excess of 18.9 MGD or 7.1 million gallons of storage (West Seattle Tunnel) to the Alki CSO treatment plant for

[1] *Combined Sewer Overflow Guidance for Permit Writers*, EPA, August 1995, pp. 4-34.

treatment. Treatment consists of pre-disinfection using sodium hypochlorite, screening, and primary sedimentation followed by dechlorination with sodium bisulfite. Treated flows discharge to the Puget Sound through the existing outfall.

Flows in excess of 65 MGD discharge via the 63rd Avenue pump station outfall, which is a permitted CSO located south and upstream of the Alki treatment plant. King County is already meeting the Ecology standard of no more than one untreated overflow per year at this location.

Wastewater flow, sludge, and grit return to the Alki Trunk for transfer to the West Seattle Tunnel and further conveyance to West Point WWTP. Collected screenings are collected and disposed of in landfills.

Carkeek CSO Treatment Plant

The Carkeek CSO treatment plant operates intermittently, only when the combined sanitary/stormwater flow during a storm exceeds the pump capacity of the Carkeek Pump Station (9.2 MGD), or 8.1 MGD when the downstream interceptor is full. The plant stores excess flow, treats it, and then returns it to the pump station at the end of the storm. From the pump station, the flow is pumped to the West Point WWTP.

If flows exceed the storage capacity of the treatment plant, the treated flows discharge to Puget Sound. Flows exceeding the capacity of the contact tank discharge to Puget Sound through a 4,200-foot long outfall. After the storm, any stored flow remaining in the plant returns to the pump station for pumping to the West Point WWTP.

The treatment process consists of screening, de-gritting, disinfection with sodium hypochlorite, primary sedimentation, and dechlorination with sodium bisulfite. The hypochlorite is added to control odors and for effluent disinfection as flow enters the grit tanks. In the grit tank, the flow is aerated and grit is pumped to the storage tanks. From the grit tanks, the flow will move into two primary sedimentation tanks. Any settled solids in these tanks will be pumped to the storage tanks. When both sedimentation tanks are full, the flow moves to the contact tank for dechlorination. From the contact tank, dechlorinated flow will go over a weir and into the outfall to Puget Sound. Once the storm subsides, the flow and solids remaining in the plant return to the pump station via the storage tanks and is then pumped to the West Point WWTP.

Grit/screening and primary sludge are collected and pumped to the West Point WWTP.

During dry weather and normal flows, the facility operates as a pump station only, pumping wastewater to the West Point WWTP. During these flows, West Point off-site crews service the pump station and CSO treatment processes three times a week. During a storm, West Point WWTP off-site operators staff the plant. Although the plant is designed to run automatically in a storm, on-site personnel monitor and conduct startup, shutdown, preventive maintenance, and operational checks.

Elliott West CSO Storage and Treatment Facility

The Elliott West CSO storage and treatment facility and associated conveyance facilities work to reduce combined sewer overflows (CSOs) to south, east, and west Lake Union and to Elliott Bay at the existing Denny Way Regulator Station. There are five different operating modes for the Elliott West CSO facility depending on the magnitude of the rain event. The operating modes are as follows[2]:

Standby Mode (Dry Weather Operation). Under dry weather conditions, the facility does not divert flow. Wastewater continues to flow through the existing Lake Union Tunnel and other conveyance facilities to the Elliott Bay Interceptor, and treated at the West Point WWTP. The Mercer Street Tunnel is empty so that the storage capacity is maintained for the storm event.

Tunnel Storage Mode. During storm conditions, water surface elevations rise to an established level at the Lake Union Tunnel Regulator, Central Trunk Diversion Structure, and/or Denny Way Diversion Structure, when flow diverts from these structures into the Mercer Street Tunnel, for storage. After the storm, when capacity is available in the Elliott Bay Interceptor, the stored wastewater flows to the West Point WWTP. Wastewater that previously resulted in a CSO discharge at the Denny Way Regulator Station or Lake Union CSOs now is stored in the Mercer tunnel.

CSO Pumping and Treatment Mode. When tunnel storage reaches its capacity and no additional flows are being accepted at the Interbay Pump Station treatment begins. Flow is pumped from the downstream end of the Mercer Tunnel into the floatable-control channel. The effluent flows through mechanical screens to remove floatable materials, then into the effluent channel, for injection with sodium hypochlorite for disinfection. From the effluent channel, the treated effluent flows to the Elliott West outfall, for injection with sodium bisulfite to neutralize residual chlorine before discharge into Elliott Bay.

Pumping and Treatment Extreme Event Mode. The CSO treatment plant capacity is planned for 250 MGD, which the County expects to handle a one-event-per-year storm. The storage/treatment system cannot handle larger storm events causing flows in excess of a flow rate of 250 MGD or extreme storm events during high tide conditions resulting in an untreated discharge at the Denny Way Regulator Station via the extended Denny Way CSO outfall. Flows discharged through the outfall extension do not receive treatment. Flows entering the Mercer Street Tunnel in excess of the flow rate of 250 MGD can overflow with no floatables control or disinfection. However, a flow rate of 250 MGD discharge continues through the Elliott West outfall, with floatables control and disinfection.

Dewatering Mode (Tunnel Drawdown). Following a CSO event, when capacity is available in the Elliott Bay Interceptor, wastewater stored in the tunnel is pumped to the Elliott Bay Interceptor and conveyed to the West Point WWTP for treatment.

[2] King County and City of Seattle, Denny Way/Lake Union CSO Control Facilities Plan, July 1998.

Henderson/MLK CSO Treatment and Storage Facility

The Henderson/MLK CSO treatment and storage facility serve to reduce combined sewer overflows (CSOs) to Lake Washington and the Duwamish River. The different operating modes for the facility depending on the magnitude of the rain event are as follows:

Inlet Regulator Operation. The County continuously monitors the level in the Henderson trunk line. When the level reaches a specified set point, the modulating gate closes causing wastewater to back up into the regulator. Wastewater then overflows the weir and flows into the tunnel. The County calculated the flow rate of wastewater into the tunnel based on the weir equation which is a function of the height of water flowing over the weir. The wastewater that flows into the tunnel is disinfected using Sodium Hypochlorite. The flow rate of addition of sodium hypochlorite is in proportion to the flow of wastewater into the tunnel.

Storage Mode. The tunnel provides storage of wastewater during peak flow events. The County monitors the level in the trunk line. When the trunk line is below a specified set point, the modulating drain valve opens and slowly drains the tunnel. The tunnel is drained such that the stored flows can pump to the secondary treatment plants, primarily to the South Treatment Plant with a small percentage of the stored flows going to the West Point WWTP. After draining, the County flushes the tunnel from the inlet regulator to flush out settled solids and so it can pump solids to the secondary treatment plants.

Treated CSO. In the event that the tunnel is filled and wastewater continues to flow into the tunnel, the wastewater overflows the discharge weir and discharges through the Norfolk outfall as a treated CSO discharge to the Duwamish River. The County calculates the flow rate of primary treated and chlorinated wastewater flowing out of the CSO storage and treatment facility based on the weir equation which is a function of the height of water flowing over the weir. The overflow flow is dechlorinated with the addition of Sodium Bisulfite. The flow rate of addition of Sodium Bisulfite is in proportion to the flow of treated wastewater flowing out of the tunnel.

Discharge Outfalls

West Point WWTP Outfall

The plant discharges treated and disinfected effluent to the Puget Sound via an eight-foot diameter, reinforced concrete pipe. The diffuser section consists of 600 feet of pipeline with 200 ports that run on the north and south sides of the pipe. The 4.5- to 5.75-inch diameter ports are located about one foot above the spring line. The diffuser terminates about 3,600 feet offshore at a depth of approximately 230 feet below mean lower low water.

The previous permit required an inspection of the West Point outfall and diffusers. The 2004 inspection of the outfall revealed that all external components to the outfall appear to be in good condition with no physical damage or lack of flow with the diffusers. Marine growth along the outfall alignment is minimal with the majority located in the diffuser area.

Alki CSO Treatment Plant Outfall

Primary treated and disinfected effluent is discharged to the Puget Sound via a 42-inch diameter pipe, which extends approximately 2,000 feet offshore and terminates at a depth of approximately 143 feet below mean lower low water. Eight 16-inch diameter risers/ports, fitted with rubber check valves, were constructed at the terminus of the outfall. The six risers/ports are spaced 20 feet apart, alternating discharge direction. The diffuser terminates with two 16-inch risers/ports discharging at an angle of 135° with respect to the other risers/ports. The capacity of the outfall is 45 MGD at mean higher high water and 65 MGD at mean lower low water. Flows in excess of 65 MGD discharge via the 63rd Avenue Pump Station outfall, a permitted CSO location.

Carkeek CSO Treatment Plant Outfall

Primary treated and disinfected effluent discharges to Puget Sound via a 33-inch diameter 4,200-foot outfall, which extends approximately 2,200 feet offshore and terminates at a depth of 195 feet below mean lower low water. The outfall has a "duck billed" check valve at the end.

Elliott West CSO Storage and Treatment Outfall

The Elliott West outfall discharges treated CSO flows from the Elliott West CSO facility. The outfall is a 96-inch diameter outfall which discharges 400 feet offshore at -60 feet MLLW. The treated, disinfected, and dechlorinated effluent discharges from the facility via the Elliott West outfall into Elliott Bay.

In addition to the Elliott West outfall, the County extended the existing Denny CSO outfall such that the 120-inch outfall is now submerged and discharges 100 feet offshore at -20 MLLW. Untreated CSOs discharges from the Denny Regulator Station via the Denny CSO outfall into Elliott Bay during a storm that exceeds the capacity of the tunnel and the Elliott West facility.

Henderson/MLK CSO Treatment and Storage Outfall

Treated CSO flow from the Henderson/MLK CSO facility discharges through the existing Norfolk outfall. The Norfolk outfall is located on the north bank of the Duwamish River approximately at river km 10.5. The 84-inch diameter outfall approaches the river bank at a 90-degree angle to the river flow and is flush with the bank. There is a flap gate on the end of the pipe that is assumed to be completely open during discharge events.[3]

The treated, disinfected, and dechlorinated effluent discharges from the facility via the Norfolk outfall into the Duwamish River.

Combined Sewer Overflow Outfalls

King County has 38 combined sewer overflows outfalls (not including the CSO treatment plant outfalls), which have the potential to discharge untreated sewage and stormwater during precipitation events, within the city of Seattle. The following is a listing of combined sewer overflows and the names of the receiving water.

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[3] King County, Department of Natural Resources, Wastewater Treatment Division, Henderson/M.L. King CSO Control Facilities Plan, February 2002. Chapter 22, pg. 2.

Table 5. Combined Sewer Overflow Outfalls and the Receiving Waters.

Discharge No.	CSO Outfall Name	Receiving Water
003	Ballard Siphon Regulator	Lake Washington Ship Canal
004	11th Avenue NW (a.k.a. East Ballard Overflow)	Lake Washington Ship Canal
006	Magnolia South Overflow	Elliott Bay/Puget Sound
007	Canal Street Overflow	Lake Washington Ship Canal
008	3rd Avenue West Overflow	Lake Washington Ship Canal
009	Dexter Avenue Regulator	Lake Union
011	East Pine Street Pump Station Emergency Overflow	Lake Washington
012	Belvoir Pump Station Emergency Overflow	Lake Washington (Union Bay)
013	Martin Luther King Way Trunkline Overflow	Lake Washington
014	Montlake Overflow	Lake Washington Ship Canal
015	University Regulator	Lake Washington Ship Canal (Portage Bay)
018	Matthews Park Pump Station Emergency Overflow	Lake Washington
027	Denny Way Regulator	Elliott Bay/Puget Sound
028	King Street Regulator	Elliott Bay/Puget Sound
029	Connecticut Street Regulator (aka Kingdome)	Elliott Bay/Puget Sound
030	Lander Street Regulator	Duwamish River – East Waterway
031	Hanford #1 Regulator	Duwamish River – East Waterway
032	Hanford #2 Regulator	Duwamish River – East Waterway
033	Rainier Avenue Pump Station Emergency Overflow	Lake Washington
034	East Duwamish River Siphon/Duwamish Pump Station Emergency Overflow	Duwamish River
035	West Duwamish River Siphon/Duwamish Pump Station Emergency Overflow	Duwamish River
036	Chelan Avenue Regulator	Duwamish River – West Waterway
037	Harbor Avenue Regulator	Duwamish River – West Waterway
038	Terminal 115 Overflow	Duwamish River
039	Michigan Regulator	Duwamish River
040	8th Avenue South Regulator (West Marginal Way Pump Station Emergency Overflow)	Duwamish River
041	Brandon Street Regulator	Duwamish River
042	West Michigan Regulator	Duwamish River
043	East Marginal Way Pump Station Emergency Overflow	Duwamish River
044	Norfolk Street Regulator	Duwamish River
045	Henderson Street Pump Station Emergency Overflow	Lake Washington
048	North Beach Pump Station Emergency Overflow	Puget Sound
049	30th Avenue N.E. Pump Station Emergency Overflow	Lake Washington Ship Canal (Union Bay)
053	53rd Street S.W. Pump Station Emergency Overflow	Puget Sound
054	63rd Street S.W. Pump Station Emergency Overflow	Puget Sound
055	S.W. Alaska Street Overflow	Puget Sound
056	Murray Street Pump Station Emergency Overflow	Puget Sound
057	Barton Street Pump Station Emergency Overflow	Puget Sound

Residual Solids

West Point WWTP

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit, screenings, debris, rags), and at the primary and secondary clarifiers. The plant generates approximately 3,500 tons of grit annually. Grit, rags, scum, and screenings are drained and disposed of as solid waste in a landfill.

Primary sludge and waste-activated sludge are blended together and thickened by gravity belt thickeners. The thickened sludge is then pumped to one-of-six anaerobic, mesophilic digesters. From the digesters, the digested sludge is withdrawn and dewatered by one-of-four centrifuges. Polymers are used in the gravity belt thickeners and centrifuges to aid sludge thickening/dewatering. The digestion process produces nutrient-rich, organic byproducts called biosolids.

According to the County's 2007 *Biosolids Quality Report*, biosolids contain water, sand, organic matter, microorganisms, trace metals, and other chemicals. The report states, "Because of their moisture content, humus-like characteristics, essential nutrients for plants, and very low levels of pollutants, biosolids are beneficial and safe to use as a soil conditioner, fertilizer for forest trees and agricultural crops, and as an ingredient of composts for landscaping."

The King County Wastewater Treatment Division (WTD) began recycling biosolids on land in 1973. The program has grown to beneficially recycle more than 110,000 wet tons (or approximately 27,000 dry tons) annually in forestry, agriculture, soil reclamation and compost.

Biosolids are regulated under both state and federal regulations (WAC 173-308 and 40 CFR Part 503). King County routinely monitors its biosolids for physical, chemical, and microbial characteristics, to examine changes over time, and to determine appropriate application rates for biosolids at reuse sites. The County's West Point biosolids continue to meet quality standards for metals, pathogen reduction (Class B), and vector attraction reduction, which means it is safe for all land application projects.

The King County General Land Application Plan for Biosolids identified the following counties/water resources inventory areas where biosolids are or may be utilized for land application.

Table 6. Counties and WRIAs for Biosolids Land Application

County	Water Resource Inventory Area
King	Cedar/Sammamish
Yakima	Lower Yakima
Douglas	Foster, Moses Coulee
Benton	Lower Yakima
Pierce	Nisqually
Adams	Lower Crab

The 2007 data report indicates that King County's biosolids quality is excellent when compared with all relevant criteria. Concentrations of regulated metals in biosolids were consistently below the most stringent state and federal standards for land application. While not required by federal or state biosolids regulations, King County analyzes its biosolids for 135 trace organic compounds listed on the EPA Priority Pollutant List (40 CFR 423, Appendix A) and the Hazardous Substances List (40 CFR 116.4 A & B) as part of the National Pollutant Discharge Elimination System (NPDES) permit monitoring. Less than 15 percent of these compounds were detected in biosolids during 2007. The County detected twenty priority pollutants at very low concentrations in the West Point biosolids. These compounds included polynuclear aromatic hydrocarbons (PAHs), phthalates, polychlorinated biphenyls (PCBs), and solvents.

Presented in the following is a summary of the biosolids characteristics for the year 2007. Unless described differently, units are "mg/kg" on a dry unit basis.

Table 7. Biosolids Characteristics for the Year 2007

Parameter	Mean 2007
pH (standard units)	8.8
Total Solids (% of wet)	26.7%
Total Volatile Solids (% of wet)	62%
Organic – N	50,100
Ammonia – N	9,300
Total Phosphorus	18,200
Potassium	1,700
Total Sulfur	11,200
Arsenic	6.36
Barium	252
Boron	15.8
Cadmium	2.95
Chromium	41
Copper	523
Lead	101
Magnesium	6,150
Manganese	741
Mercury	1.42
Molybdenum	10.2
Nickel	30.5
Selenium	6.92
Silver	16.9
Zinc	940

Alki CSO Treatment Plant

During a storm, grit and primary sludge collect in the storage tanks. The storage tanks drain to the pump station once the storm subsides. These solids are then pumped to the West Point plant for treatment.

Carkeek CSO Treatment Plant

During a storm, grit and primary sludge collects in the storage tanks. The storage tanks drain to the pump station once the storm subsides. These solids are then pumped to the West Point plant.

Elliott West CSO Treatment Plant

The storage tunnel for the Elliott West CSO treatment facilities allows solid material to settle out inside the tunnel. Solids in the Mercer Tunnel are flushed out of the tunnels to be pumped to the secondary treatment plant (West Point WWTP) for further treatment and removal following the storm events.

MLK/Henderson CSO Treatment Plant

The storage tunnel for the Henderson/MLK CSO treatment facilities allows solid material to settle out inside the tunnel. Solids in the Henderson/MLK Tunnel are flushed out of the tunnels to be pumped to the secondary treatment plant (South Plant) for further treatment and removal following the storm events.

B. Permit Status

Ecology issued the previous permit for this facility on December 31, 2003, and modified the permit and fact sheet on June 20, 2005, to include the Elliott West and MLK/Henderson CSO treatment facilities. The previous permit placed effluent limits on $CBOD_5$, TSS, Fecal Coliform Bacteria, pH, and total residual chlorine for the West Point WWTP. The permit also included effluent limits for TSS removal efficiency, fecal coliform bacteria, settleable solids, and total residual chlorine for the CSO treatment facilities. King County submitted an application for permit renewal on June 30, 2008. Ecology accepted it as complete on August 1, 2008.

C. Summary of Compliance With Previous Permit (Issued on December 31, 2003, and Modified on June 20, 2005)

West Point WWTP

In accordance with permit requirements, King County completed an Assessment of Flow and Wasteload for the West Point WWTP.

Previous Ecology inspections included a non-sampling inspection on June 28, 2007; a sampling inspection on January 28, 2003, of the WWTP; and an inspection of the combined sewer overflow (CSO) outfalls in July 2004. On December 17-18, 2007, Ecology staff conducted a compliance inspection (including sampling) of the West Point WWTP. During this inspection, the County's analytical results closely matched the split sampling results by Ecology. The only exceptions were influent BOD and influent CBOD. Table 13 includes the County's and Ecology's sampling results. In general, the plant appeared well maintained and operated during the inspection. Ecology found no violations of the permit during this inspection.

Table 8. Class 2 Inspection, Comparative Sampling Results

Parameter	King County Results		Ecology Results	
	Influent	Effluent	Influent	Effluent
TSS	123 mg/L	9 mg/L	144 mg/L	8 mg/L
Total BOD	63 mg/L	14 mg/L	149 mg/L (duplicate 170 mg/L)	Not reported
CBOD	88 mg/L	7 mg/L	128 mg/L	9 mg/L
Fecal Coliform		0/100 mL		9/100 mL (duplicate 11/100 ml)

The West Point WWTP had no effluent limit violations for $CBOD_5$, TSS, pH, or fecal coliform for the period January 1, 2004, to June 30, 2008.

The West Point WWTP had fourteen (14) disinfection failures during the current NPDES permit cycle (January 1, 2004 – July 2008) . The County has attributed disinfection problems to leaks and debris in the evaporators, plugs in injectors, flooded chlorinators, closed manifold valves, and operator error. The County could not identify cause(s) of some of the disinfection failures. Ecology issued a Notice of Violation in August 2004 and a Notice of Penalty in March 2006 and October 2007. King County paid the two fines associated with the disinfection penalties, modified operations, and implemented new procedures to ensure all required samples are collected.

In July 2008, Ecology issued a $30,000 penalty to King County for the unauthorized discharge of approximately 6.8 million gallons of sewage to Ravenna Creek. Other enforcement actions by Ecology include a Notice of Violation in May 2004 for a South Michigan regulator overflow to the Duwamish and a warning letter in July 2007 for missed CBOD sampling.

Appendix D provides a complete summary of the DMR data from January 1, 2004 to June 2008.

Alki CSO Treatment Plant

The Alki treatment plant began operation as a CSO facility in November 1998. King County has since completed an Assessment of Flow and Wasteload for this facility. The assessment evaluated compliance based on the interim (January 1, 2004 to December 31, 2005) and final (January 1, 2006 to December 31, 2008) discharge limits established in the NPDES permit.

Presented in the following table is a summary of the plant operating data for January 2004 through July 2008, as contained in the permit application.

Table 9. Alki CSO Plant Reporting Data 2003-2007

Year	Avg Annual TSS mg/l or % removal	Avg Settleable Solids, ml/l/hr	Discharge Volume Per Year, MG	Discharge Events Per Year	Events Removed From Summary - Once Per Year Untreated Event Is Allowed
Limit	**60 mg/l or 50%**	**0.3 ml/l/hr**	**108**	**29**	
Jun 03 – Dec 03	44-mg/L	0.14	36.9	2	No events removed
Jan 04 – May 04	41%	0.15	8.6	2	No events removed
Jun 03 – May 04	40%	0.13	34.0	3	No event removed
Jun 04 – May 05	41%	0.2	20.4	1	No events removed
Jun 04 – May 05	82 % (b)	NA	NA	0	Jan. event removed (c)
Jun 05 – May 06	46.0%	0.3	59.4	4	No events removed
Jun 05 – May 06	56.7%	0.3	39.2	3	Jan. 29 event removed
Jun 06 – May 07	41.5%	0.2	68.2	6	No events removed
Jun 06 – May 07	47.0%	0.2	46.1	5	Dec. 14 event removed
[a] In January 2004, TSS limit changed from 60 mg/L annual maximum to 50% removal annual minimum.					
[b] Besides the one discharge event in 04-05 which was designated as "untreated," there was another filling event with a TSS removal equal to West Point's TSS removal that day = 82%.					
[c] After December 2004, Ecology allowed KC to use the monthly average % TSS removal at West Point used in calculation rather than daily % removal requirement.					

The long-term average (i.e. permit cycle length) effluent discharge volume and number of events is limited to 108 million gallons (MG) and 29 discharge events, respectively. During the current permit cycle, the Alki CSO treatment plant averaged 53.9 MG and 3.8 discharge events over the last 5 years. Therefore, the Alki CSO treatment plant complied with both conditions for the years of data shown in the above table.

In regard to settleable solids, the Alki CSO treatment plant complied with the Maximum Settleable Solids limit (1.9-mL/L/hr) for all discharge events and with the annual average limit (0.3-mL/L/hr) for the period January 2004 to June 2008.

The Alki CSO treatment plant complied with the annual 60-mg/L effluent TSS limit during the short time this limit was in effect for this reporting period (June 2003-December 2003). In January 2004, Ecology replaced the effluent TSS mg/L limit with an annual 50% TSS removal limit. This limit allows the County to remove one discharge event per year before determining compliance. Alki has not consistently complied with the annual 50% suspended solids (TSS) removal requirement. For two of the four years of data, annual TSS removal was only 47% and 41%.

The table below shows compliance with effluent chlorine and the fecal coliform limits, including the geometric means of the fecal coliforms measured each discharge month since 2006. The County met the average monthly fecal coliform limit all four months shown while it met the maximum day chlorine limit only two out of the five months.

Table 10. Alki CSO Treatment Plant – Disinfection Compliance (Limits Effective January 1, 2006)

Month	Average Monthly Fecal Coliform (limit: 1700-cfu/100-ml)	Maximum Day Effluent Chlorine (limit: 290-µg/L)
December 2006	54	1135
January 2007	4	515
December 2007	22	3228

For the time period (January 2004 to June 2008), the County discharged a total of 16 treated combined sewer overflows from the Alki CSO treatment plant. As a result of permit violations, Ecology issued the following enforcement actions.

Table 11. Alki CSO Treatment Plant – Ecology Enforcement Actions

Action Date	Type of Enforcement Action	Violation Details
October 2004	WARNING LETTER	Annual average TSS % removal = 40. Limit = 50% or greater required.
December 2005	WARNING LETTER	Not reporting influent BOD. Also missed samples for BOD, pH, and fecal coliform.
January 2006	WARNING LETTER	Fecal coliform GM7 = 2000 Limit = 1700
December 2006	WARNING LETTER	Chlorine maximum daily = 1135 µg/L Limit = 290 µg/L
January 2007	WARNING LETTER	Chlorine maximum daily = 515 µg/l Limit = 290 µg/L
October 2007	WARNING LETTER	Annual average TSS % removal = 47% Limit = 50% or greater required.
December 2007	WARNING LETTER	Chlorine maximum daily = 3228 Limit = 290 µg/L

The Flow and Wasteload Assessment, included with the permit application, identified ongoing projects to modify and to optimize the facility. Beginning in 2004, King County staff began working on improving communications between the East and West Operators of the collection systems; including adding the capability to see flows and levels in the West Seattle Tunnel from South Plant and changing the flow handling strategy at the West Seattle Pump Station. Over the past year, staff sent flows sooner to Alki by backing pumps down at West Seattle when the Elliot Bay Interceptor is full. The County believes this operational strategy should allow Alki to more consistently comply with the 50% TSS removal requirement.

The County has had difficulty in consistently meeting the maximum daily chorine limit due to limited operating experience with new equipment and mechanical problems with the bisulfite pumps. In 2007, it replaced both bisulfite pumps with higher capacity pumps able to dose the required amount of chemical to neutralize the chlorine residual down to permit levels.

The County plans to upgrade the three pump station upstream of the 63rd Avenue PS (53rd, Murray & Barton) in the next 5-10 years. These projects will increase the storage upstream of the 63rd Avenue Pump Station, helping to reduce untreated combined sewer overflows. It may also tend to increase the volume treated at Alki. The County will need to review operational strategies at 63rd Avenue PS, the inlet regulator gate, and the West Seattle PS/Tunnel as these projects move forward.

Carkeek CSO Treatment Plant

In accordance with permit requirements, King County completed an Assessment of Flow and Wasteload for the Carkeek CSO facility. The assessment evaluated compliance based on the discharge limits established in the NPDES permit.

Presented in the following table is a summary of the plant operating data, as reported in the permit renewal application.

Table 12. Summary of Carkeek CSO Plant Operating Data

Year	Average TSS Removal Per Year (%)	Average SS Per Year (ml/l/hr)	Discharge Flow Per Year (MG)	Discharge Events Per Year	Fecal Coliform, Max. Monthly Geo. Mean (cfu/100-mL)	Total Residual Chlorine, Highest Max Daily (µg/L)	"Once Per Year Untreated Event" - Removed
	Limit ≥ 50%	Limit=0.3 ml/l/hr	Limit=46 MG/yr	Limit=10/yr	Limit=2800 cfu/100 ml	Limit=490 µg/L	
2003-04	53	<0.10	27.19	4	NA	NA	10/20/03-10/21/03
2004-05	64.9	0.17	4.04	4	NA	NA	8/22/04
2005-06	55.8	0.08	54.72	6	32	271	1/8/06-1/17/06
2006-07	50.2	0.10	21.68	8	75	359	
Averages	**56**	**0.09**	**26.91**	**5.5**	**NA**	**NA**	

For the time period June 2003-July 2008, Ecology issued two warning letters to the County for apparent violations in January 2006 and October 2006, as described in Table 13. However, upon further investigation, Ecology mistakenly issued these non-formal enforcement actions, as they did not constitute actual permit violations.

Table 13. Carkeek CSO Treatment Plant – Ecology Enforcement Actions

Action Date	Type of Enforcement Action	Violation Details
January 2006	WARNING LETTER [1]	Fecal Coliform GM7 = 5000 cfu/100mL Limit = 2800 cfu/100mL
October 2006	WARNING LETTER [2]	Flow volume/year = 54.72 MG Limit = 46 MG/yr (Average is based over 5 years of permit cycle)

[1] Not a violation. Value of 5000 cfu/100mL was not a weekly or monthly geometric mean value. This value was incorrectly entered into Ecology's database.

[2] CSO volume for 2005-2006 = 54.72 MG. This is not a permit violation as it is a one-year average and permit compliance is based on 5 years.

The Carkeek CSO plant is meeting the annual limits for average TSS removal, number of events per year, and the annual average settleable solids limit in effect since 2003. The plant also met the maximum monthly geometric mean limit for the effluent fecal coliforms and the maximum of daily average effluent total residual chlorine. For the year June 2005 to May 2006, the Carkeek CSO plant exceeded the maximum allowable average yearly flow.

The performance of the Carkeek CSO plant over the last two reporting periods demonstrates that the disinfection and dechlorination systems effectively allow the County to meet the fecal coliform and total residual permit limits. In the near future it plans to further optimize the disinfection and dechlorination systems with the installation of a pre-dechlorination analyzer and a compound feedback loop control.

Elliott West CSO Treatment Facility

In accordance with permit requirements, King County completed an Assessment of Flow and Wasteload for the Elliott West CSO facility. The assessment evaluated compliance based on the discharge limits established in the NPDES permit.

Presented in the following table is a summary of the plant's compliance record, as reported in the permit application, from June 2005 through May 2008.

Table 14. EWCSO Compliance June 2005 through May 2008

Year	Discharge Volume (MG)	% TSS Removal/yr	Average Set. Sol./yr mL/L/hr	Max. Set. Sol. Per Event (ml/l/hr)	Fecal Coliform, Max. Monthly, (cfu/100 mL)	Total Residual Chlorine, max. Daily (µg/L)	Once/Year "Untreated" Event Removed
June 2005 – May 2006	315.6	30.8	0.53	2.3	Not in compliance	In compliance only 1 month in 4 months of discharge	
June 2006 – May 2007	489.2	29.5	1.11	13	In compliance only 1 month in 5 months of discharge	In compliance only 2 months in 5 months of discharge	1 event: (12/09/06-12/15/06)
June 2007 – May 2008	188.7	64.4	0.86	4	In compliance 2 months in 3 months of discharge	In compliance 1 month in 3 months of discharge	
Permit Limits	**NA**	**Greater than 50 %**	**0.3 mL/L/hr[1]**	**1.9 mL/L/hr**	**400 cfu/100 mL**	**44 µg/L**	

[1] Discharge Limitation (yearly average)

The EWCSO facility did not met the annual limits for percent TSS removal, monthly settleable solids limit, the maximum monthly geometric mean limit for the effluent fecal coliforms, and the maximum of daily averages for total residual chlorine. Due to permit violations, Ecology conducted the following enforcement actions.

Table 15. EWCSO Treatment Plant – Ecology Enforcement Actions

Action Date	Type of Enforcement Action	Violation Details
September 2007	NOTICE OF VIOLATION	Sampling and disinfection problems.
December 2005	WARNING LETTER	No reporting of chlorine, fecal coliform, and pH. Also missed samples for chlorine, fecal, and pH.
January 2006	WARNING LETTER	Violated chlorine µg/L max. 1524 Limit = 44 Fecal coliform GM7 = 300000 Limit = 400 Settleable solids ml/l max. = 2 Limit = 1.9.
February 2006	WARNING LETTER	Settleable solids ml/l avg. and max. not reported.
October 2006	WARNING LETTER	Settleable solid max. = 0.53 Limit = 0.3 TSS % removal = 30.8% Limit = 50%
November 2006	WARNING LETTER	Chlorine max. daily = 259 Limit = 44 Fecal coliform GEM = 3382 Limit = 400 Settleable solids max. = 13 Limit = 1.9
December 2006	WARNING LETTER	Chlorine max. day = 105 Limit = 44 Settleable solids max. =2 Limit = 1.9.
January 2007	WARNING LETTER	Chlorine max. = 986 µg/l Limit = 44
August 2007	WARNING LETTER	Influent BOD_5 max. and avg. data missing.
October 2007	WARNING LETTER	Violated settleable solids max. day = 1.1 Limit = 0.3 TSS % removal = 29.5% Limit = not less than 50%
November 2007	WARNING LETTER	Did not report chlorine (avg. and max.), fecal coliform (GEM and max.), and pH (min. and max.)
December 2007	WARNING LETTER	Violated chlorine max. day = 73 limit = 44 Settleable solids max. = 4 Limit = 1.9 Fecal coliform GEM = 10024 Limit = 400

Per the County's permit application, several contributory factors affected permit compliance, including the lack of a thorough commissioning of the facility, equipment performance (auto samplers, sampling pumps, dewatering pumps, pump discharge channel gate), equipment warranty issues, conflicting programmable logic controller permissives that were disabling the chlorination and dechlorination systems, poor mixing of chemicals, and hydraulic gradient issues that were causing surcharging at the dechlorination and outfall transition structures. The County hired a start-up engineer in February 2006 to diagnose and to begin resolving the instrumentation and equipment issues, and to improve the facility's performance for permit compliance. Hydraulic limits of the EWCSO system observed during November and December of 2006, prompted King County to issue an emergency contract to bring an engineering consultant onboard late December to analyze the various performance issues and to formulate solutions to achieve consistent permit compliance.

As a result of the compliance problems, Ecology issued a Notice of Violation on September 6, 2007. King County has diligently worked to bring the facilities into control and compliance. The permit application includes the below table which summarizes the work that is underway or being planned by King County staff or contractors to diagnose and address operational problems in the Elliott West system.

Table 16. Future EWCSO Projects to Address Noncompliance

WORK IN PROGRESS			
#	**ITEM**	**ISSUE TO BE ADDRESSED**	**STATUS**
Screening			
1	Improve screenings removal.	Existing screens are not effectively removing floatables. Consultant contract to address screening improvements.	Ongoing work under consultant contract.
Returned Flow by Main Pumps - Sampling			
2	Modify the sampling pipe intake to ensure collection of composite sample.	Loss of suction due to sampler being too far away from the sample intake.	Modification completed in October 2007.
Returned Flow by Dewatering Sump Pumps - Sampling			
3	Relocate the dewatering composite sampler closer to the dewatering sump pumps.	Current location of the sample intake on the discharge piping was at times under negative pressure.	To be completed in summer 2008.
EWCSO - Power			
4	Installation of automatic transfer switch.	Currently, power to EWCSO needs to be switched manually if the power supply to the facility is switched to alternative feeder.	Evaluation for additional work and equipment upgrade.
Chemical System Improvements			
5a	Hypochlorite mixing equipment upgrade.	Inadequate mixing is causing poor disinfection of discharged flows and excessive usage of hypochlorite.	Ongoing work under consultant contract.
5b	Bisulfite mixing equipment upgrade.	Inadequate mixing is causing poor dechlorination of discharged flows and excessive usage of sodium bisulfite.	Ongoing work under consultant contract.
5c	Pre-dechlorination sample system installation.	Existing sampling system is need of replacement due to poor design, location, and corrosion.	Installed an interim sampling system.
5d	Feedback loop control installation for disinfection and dechlorination systems to optimize chemical usage and meet permit compliance.	Existing controls are inadequate for optimal chemical dosing.	Awaiting completion of pre-dechlorination sampling system (see item 5c above).
Dechlorination Structure Modifications			
6	Addition of an above-ground structure over the dechlorination structure to overcome hydraulic grade line limits.	During large storm events, the hydraulic grade line (HGL) in the Elliott West Effluent Pipeline is higher than the tops of the dechlorination structure and the transition structure, forcing flow to escape the structures and flow overland through Myrtle Edwards Park and into Elliott Bay.	Issue construction contract under an emergency waiver summer 2008.

MLK/Henderson CSO Treatment Facility

The June 2005–May 2006 season was the first time the Henderson/Norfolk CSO treatment facilities were available for use. During that year, these facilities did not store or treat CSO flows. Mechanical and program control errors with the inlet regulator gate were the primary reasons. The County corrected the problems with the inlet regulator gate before the second wet season. Thus, the 2006–07 season was the first opportunity to operate and optimize this facility under storm conditions. November 2006 was the first time that the Henderson/Norfolk CSO facility discharged treated CSOs. There were seven filling and three discharge events during the 2006-07 CSO season, the first year of operation. The facility discharged a total of 9.0-MG of treated CSO over the year.

Table 17. MLK/Henderson Compliance (June 2005 – May 2007)

Year	TSS % removal/yr	Average Set. Sol./yr mL/L/hr	Fecal Coliform, Max. Monthly, (cfu/100 mL)	Total Residual Chlorine, Max. Daily (µg/L)	Comments
June 2005 – May 2006					Problems prevented CSO flows from being stored or treated
June 2006 – May 2007	75.6	0.3	325 (Dec 2006)	188 (Nov 2006) 300 (Dec 2006)	Dec. 11-15 event removed
June 2007 – May 2008	58.7	0.2	6158	172	
Permit Limits	**Greater than 50%**	**1.9mL/L/hr[1] 0.3 mL/L/hr[2]**	**400**	**39**	

For the period June 2006 to May 2007, the County met all discharge permit conditions except for the maximum daily chlorine limit. The maximum daily chlorine limit was exceeded on all three discharge events. There were numerous mechanical and monitoring problems related to the application of the bisulfite that contributed to this problem. The sample pump that fed the tunnel effluent chlorine analyzer failed in November 2006. This provided little feedback to allow operators to optimize the bisulfite addition. The inability to meet the chlorine limit in December 2006 was due to a failure of the bisulfite dosing system. In fact, no bisulfite was applied during any of the December 2006 discharge events. This was mainly due to the bisulfite pumps becoming gas-bound (bisulfite solution will off-gas). The County subsequently installed vent lines on the bisulfite pumps in January 2007 to address this problem. Despite its efforts, the fecal coliform limit and the total residual chlorine limit were exceeded in December 2007. Due to permit violations, Ecology made the following enforcement actions.

Table 18. MLK/Henderson – Ecology Enforcement Actions

Action Date	Type of Enforcement Action	Violation Details
November 2006	WARNING LETTER	Chlorine max. daily = 188 µg/L Limit = 39 µg/L
December 2006	WARNING LETTER	Chlorine max. daily = 300 µg/L Limit = 39 µg/L
December 2007	WARNING LETTER	Chlorine max. daily = 172 µg/L Limit = 39 µg/L

To provide corrective action, the County has made several additional changes to increase the ability of staff to monitor the dechlorination process and make appropriate changes. It installed a sample hatch upstream of the bisulfite addition to collect grab samples for monitoring chlorine residuals. The hypochlorite dosing pumps and bisulfite pumps can now be adjusted to best meet the fecal coliform and chlorine limits.

D. Wastewater Characterization

West Point WWTP

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The following table presents a summary of the effluent characteristics. The priority pollutant scan data presented in the below table contains only detectable compounds and elements.

Table 19. West Point WWTP - Conventional and Non-Conventional Analytical Results

Parameter	Maximum Daily (mg/L)	Average Daily (mg/L)	Number of Samples
Ammonia as N	30.1	18.2	185
Chlorine, total residual	0.406	0.072	1461
Total Kjeldahl Nitrogen	45.9	19.9	189
Nitrate Plus Nitrite Nitrogen	9.07	2.40	181
Oil and Grease	7.5	4.17	32
Phosphorus, total	9.66	2.75	180

Table 20. West Point WWTP – Detected Priority Pollutants

Parameter	Maximum Daily Discharge		Average Daily Discharge		# of Samples
	Conc.	Units	Conc.	Units	
Antimony	0.95	µg/l	0	µg/l	17
Arsenic	0.002	mg/l	0.001	mg/l	15
Cadmium	0.1	µg/l	0.1	µg/l	17
Chromium	0.001	mg/l	0.001	mg/l	17
Copper	0.017	mg/l	0.011	mg/l	17
Lead	0.001	mg/l	0.001	mg/l	17
Mercury	0.008	µg/l	0	µg/l	17
Nickel	0.004	mg/l	0.003	mg/l	17
Silver	0.91	µg/l	0.439	µg/l	17
Zinc	0.044	mg/l	0.035	mg/l	18
Total Phenolic Compounds	0.45	mg/l	0.029	mg/l	17
Chloroform	8.21	µg/l	4.34	µg/l	10
Methylene Chloride	9.1	µg/l	0.91	µg/l	10
Tetrachloroethylene	1.4	µg/l	0	µg/l	10
bis (2-ethylhexyl) phthalate	3.03	µg/l	2.07	µg/l	9
1,4-Dichlorobenzene	10.1	µg/l	6.96	µg/l	9
Diethyl phthalate	1.6	µg/l	0	µg/l	9

Alki CSO Treatment Plant

The permit required one priority pollutant sampling event for this facility. Accordingly, the County installed an auto-sampler for this plant on November 7, 2007. The County collected storm samples between December 2 and December 4, 2007, including four flow weighted composite samples and one grab sample. The concentrations of pollutants in the discharge were reported in the NPDES application. The following table presents a summary of the effluent priority pollutant scans for the December 2-4, 2007, storm event.

Table 21. Alki CSO Treatment Plant – Detected Priority Pollutants

Parameter	Sampling Round				
	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	Grab Sample
Total Phenolics					0.03 mg/L
Antimony	0.98	0.65	0.76	0.79	
Arsenic, Total	2.86	2.64	3.31	2.5	
Barium, Total	18.7	16.1	26.7	19.4	
Cadmium, Total	0.15		0.14	0.12	
Chromium, Total	4.97	3.44	5.45	2.34	
Copper, Total	23.9	14.7	17	14.5	
Lead, Total	9.94	8.81	8.42	5.25	
Mercury, Total	0.1				
Nickel, total	7.3	4.69	8.07	5.11	
Silver, Total	0.31			0.25	
Zinc, Total	79.5	51	49.1	50.9	
4-Methylphenol	6.42	4.65	2.04	10.5	
Acetone					17.6 µg/L
Benzoic Acid	35.9	11.1	9.35	53.5	
Benzyl Alcohol	3.92	1.8	1.6	3.81	
Bis(2-Ethylhexyl)Phthalate	5.14	2.94	2.65	5.77	
Caffeine	22.8	12.1	7.89	14.7	
Chloroform					41.4 µg/L
Chloromethane					2.02 µg/L
Diethyl Phthalate	2.8	2.5	2.47	4.1	
Dimethyl Phthalate				0.43	
Toluene					2.67 µg/L
n-Octadecane	1.17	0.82		1.33	
Discharge Volume	5.5 MG	27.5 MG	24.5 MG	5.6 MG	

Carkeek CSO Treatment Plant

The permit required one sampling event for this site. Accordingly, the County installed an auto-sampler for this plant on November 5, 2007. It collected a storm sample between December 2 and December 5, 2007, including four flow weighted composite samples and one grab sample. One flow weighted composite was lost between 1418 hours on December 2 to 0815 hours on December 3 due to a broken carboy in the auto-sampler.

The concentration of pollutants in the discharge was reported in the NPDES application. The following table presents a summary of the effluent priority pollutant scans for the storm event.

Table 22. Carkeek CSO Treatment Plant – Detected Priority Pollutants

Parameter	Sampling Round				
	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	Grab Sample (µg/L)
Antimony	0.6	0.85	0.72	0.66	
Arsenic, Total	3.25	3.18	2.3	1.9	
Barium, Total	17.7	28.2	24.7	22	
Cadmium, Total	0.13	0.17	0.14	0.12	
Chromium, Total	2.41	3.04	1.2	0.88	
Copper, Total	21.6	16.7	9.91	10.9	
Lead, Total	6.46	8.62	3.35	2.32	
Nickel, total	2.7	4.35	2.69	2.65	
Zinc, Total	86.7	59.8	47.6	46.9	
4-Methylphenol	9.85	1.6	2.41	7.45	
Acetone					28.1
Benzoic Acid	13.3	7.1	12.7	41.2	
Benzyl Alcohol	4.99	4.29	2.14	3.15	
Benzyl Butyl Phthalate	0.59	0.8	0.57		
Bis(2-Ethylhexyl)Phthalate	6.71	1.64	2.06	4.33	
Caffeine	33.9	5.44	8.37	23.4	
Chloroform					8.38
Diethyl Phthalate	3.62	2.09	2.65	3.92	
Toluene					8.18
n-Octadecane	1.95	0.8	1.3	1.66	
Discharge Volume	0.31 MG	5.5MG	9.5 MG	4 MG	

Elliott West CSO Treatment Plant

The permit required three sampling events, approximately one per year, for this site. However, as of May 21, 2008, the County has only collected one partial and one full storm sample.

The County installed an auto-sampler for this plant on November 13, 2007. It collected a storm sample on November 16, 2007, from 0157 hours to 0315 hours. Only one flow weighted composite sample was collected due to the short duration of sample collection. The County did not collect a grab sample because the discharge did not last long enough for environmental laboratory staff personnel to get to the facility before flow ceased. The composite sample was analyzed for all required parameters except for volatile organics and cyanide due to insufficient sample volume.

The County collected a second full storm sample set between December 2 and December 4, 2007. Five flow weighted composite samples and one grab sample were collected during the duration of the storm.

A third storm on approximately March 23, 2008, was missed due to auto-sampler failure. The County believes this failure can be attributed to cable and power issues. The County has stated that they believe these issues are now fixed.

The concentration of pollutants in the discharge was reported in the NPDES application. The following table presents a summary of the effluent priority pollutant scans for the storm event.

Table 23. Elliott West CSO Treatment Plant – Detected Priority Pollutants

Parameter	Sampling Round						
	Nov. 13, 2007 (µg/L)	Dec 2-4, 2007 Samp 1 (µg/L)	Dec 2-4, 2007 Samp 2 (µg/L)	Dec 2-4, 2007 Samp 3 (µg/L)	Dec 2-4, 2007| Samp 4 (µg/L)	Dec 2-4, 2007 Samp 5 (µg/L)	Grab Sample Dec 2-4, 2007 (µg/L)
Antimony	1.1	1.2	1.1	1.1	1.3	1.7	
Arsenic, Total	2.5	2.1	2.2	3.06	3.3	3.88	
Barium, Total		24.1	20.7	22.9	30.5	35.9	
Cadmium, Total	0.33	0.2	0.14	0.17	0.18	0.25	
Chromium, Total	8.24	4.69	3.64	3.58	3.92	5.42	
Copper, Total	288*	35.7	28.3	24.4	36.4	45.8	
Lead, Total	37.2	15.3	14	9.51	22	18.6	
Mercury, Total	0.076	0.12				0.06	
Nickel, total	7.2	4.27	3.52	4.2	4.84	5.57	
Silver, Total	0.42	0.43	0.26	0.56	0.63	2.94	
Zinc, Total	93.9	110	85.9	74.2	107	122	
4-Methylphenol		2.91	4.61	5.15	20	12.7	
Acetone							31.2
Benzoic Acid			16.6	4.6	15.4		
Benzyl Alcohol		2.22	1.7	3.63	4.08	5.22	
Benzyl Butyl Phthalate		0.58			0.58	0.71	
Bis(2-Ethylhexyl)Phthalate	9.36	4.35	3.88	3.92	4.81	5.88	
Caffeine	2.56	18.6	12.2	17.5	58.5	55	
Chloroform							1.2
Diethyl Phthalate	1.6	2.01	1.91	2.06	3.43	2.99	
Toluene							7.49
n-Octadecane		0.72	0.75	0.63	0.97	0.93	
Discharge Volume	1.0 MG	17.5 MG	108 MG	52 MG	4.4 MG	2.7 MG	

*- considered anomalous and therefore not used in reasonable potential calculation.

MLK/Henderson CSO Treatment Plant

The permit required three priority pollutant sampling events, approximately one per year, for this site. However, as of May 21, 2008, the County has not collected any priority pollutant samples, despite discharge events from this facility. The auto-sampler for this plant was not installed until January 28, 2008.

Since the County failed to collect the required priority pollutant data, the proposed permit has increased sampling frequency to address this data gap.

Whole Effluent Toxicity Testing (West Point WWTP)

Acute and chronic toxicity testing was conducted in April 2007, July 2007, October 2007, and January 2008. Acute toxicity tests were conducted with Daphnia pulex and fathead minnow. Chronic toxicity tests were conducted with Atherinops affinis and Mysidopsis bahia. Please refer to Appendix K for toxicity test results.

For acute toxicity, the performance standard is the median survival in 100% effluent being equal to or greater than 80% and no individual test result showing less than 65% survival in 100% effluent. For the above tests, the median survival in 100% effluent was 100%. However, the West Point effluent had less than 65% survival in 100% effluent in the fathead minnow acute test (RMAR0963) in one sample taken July 16, 2007. Total ammonia in the sample was 18.4 mg/L. Ammonia is the most likely cause of the acute toxicity. No other recent acute tests had any acute toxicity; however, this one test result means that West Point must have another effluent characterization for acute WET and receive an acute WET limit if survival is less than 65% in 100% effluent again.

For chronic toxicity, the performance standard is no chronic toxicity test demonstrating a statistically-significant difference in response between the control and a test concentration equal to the acute critical effluent concentration (ACEC). West Point had no chronic toxicity anywhere near the ACEC of 3.1% effluent in any recent test. No chronic WET limit is needed. The proposed permit includes the same set of chronic tests at the end of the new permit term for submission with the application.

Sediment Testing (West Point Outfall)

Sediment testing in 1998[4], 2000[5], and 2006[6] occurred at 12 to 19 stations and included chemistry, bioassays, and benthic surveys as shown in the table below. The results are compared to the Sediment Quality Standards (SQS) criteria for marine water.[7] The sediment sampling stations are shown in the figure below.

[4] King County 1998. *SEDQUAL* data WPNT98.
[5] King County 2000. *SEDQUAL* data WPNT00.
[6] King County 2006. *West Point Wastewater Treatment Plant 2006 Outfall Sediment Sampling Event Final Report.* King County Department of Natural Resources and Parks, Marine and Sediment Assessment Group, September 2007. *SEDQUAL* data WPNT06.
[7] Ecology 1995. *Sediment Management Standards*. Chapter 173-204 WAC. Amended December 1995. http://www.ecy.wa.gov/programs/tcp/smu/sed_standards.htm

Figure 4. West Point WWTP – Sediment Sampling Station Locations

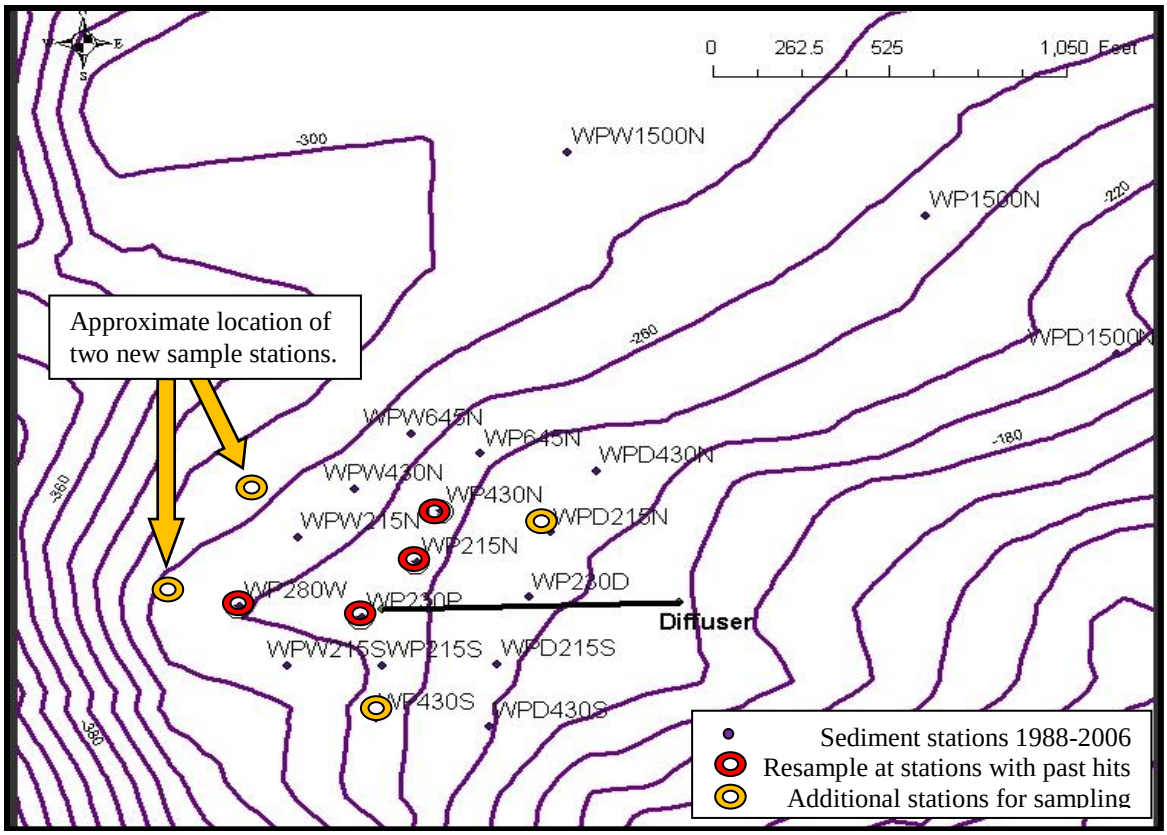

Table 24. West Point WWTP – Sediment Test Results

Year	Chemistry # of stations	Bioassays # of stations	Benthic Surveys	SQS Hits*	Stations
2006	19	10	10	Bioassays	WP280W WP230P WP215N
2000	12	2	6	Bioassays	WP230P WP430N
1998	12	2	5	Chemistry Bioassays	WP230P WP430N

* Unable to determine compliance with Sediment Management Standards for the benthic surveys due to lack of reference station.

Except for one station in 1998, all detected concentrations have met the SQS chemical numeric standards (1988 Lowest Apparent Effects Threshold - LAET). Due to low organic carbon content, chemical concentrations were compared to the 1988 LAET dry weight thresholds that are the basis for the organic carbon-normalized criteria in the Sediment Management Standards. Although a few stations had elevated levels of Polycyclic Aromatic Hydrocarbons (PAH), all met the chemical criteria in 2006. In 2000, some samples had Method Detection Limits (MDL) above SQS for Hexachlorobutadiene, but it also was not detected in the influent or effluent. In 1998, there were 42 non-detects and 5 detected concentrations above SQS. The five detected

exceedances all occurred at one station, WP230P, and included Benzo(g,h,i)perylene, Fluoranthene, Indeno(c,d)pyrene, Phenanthrene, and Pyrene (all PAH compounds). Bioassays have indicated toxic effects at a few stations near the end of the outfall in all years. The following four stations have failed one or more bioassays in one of the three sampling years: WP280W, WP230P, WP215N, WP430N. Some of these stations coincide with elevated concentrations of PAH compounds. Station WP280W failed all three bioassay tests in 2006, but there was no indication of elevated concentrations in any of the chemicals tested. Station WP230P has failed bioassay tests for all three sampling events.

In 1998 and 2000, benthic surveys showed benthic abundance and diversity were reduced at two stations (WP230P, WP430N) compared to the other sites near the outfall. These two stations also had bioassay toxicity. In 2006, no differences were evident between the stations. We were not able to compare benthic data to the SQS criteria due to the lack of an appropriate reference station.

In summary, sediment monitoring has occurred on three occasions (1998, 2000, and 2006) in the past ten years near the West Point WWTP outfall. Many of the stations have consistently shown no indication of chemical or biological effects. Except for one station in 1998, all detected concentrations have met the Sediment Quality Standards chemical numeric standards (88 LAET dry weight). Bioassays have indicated apparent sediment toxicity at a few stations near the end of the outfall in all years. The chemical cause of the benthic toxicity is not evident from the existing data. Benthic surveys showed that in 1998 and 2000, benthic abundance and diversity were reduced at the two stations that also had bioassay toxicity (WP230P, WP430N), but this was not evident in 2006. Sediment monitoring will continue in the vicinity of the outfall with more focus on investigating the area which has shown some evidence of sediment impacts.

Sediment Testing (CSO Outfalls)
Sediment monitoring has occurred at several of the major CSO discharge locations. At least four locations near CSO outfalls have become sediment remediation sites (Denny Way, Norfolk, Diagonal/Duwamish, and Hanford/Landers). Fourteen CSO outfalls discharge into the Duwamish Waterway. Sediment monitoring has occurred at some other CSO outfalls, however, there is no comprehensive summary so that Ecology can evaluate data gaps.

Some monitoring and remediation activities are listed below:

- In 1999, King County developed a Sediment Management Plan that identified seven contaminated sediment sites near CSO discharges.[8] Four of those sites have at least some cleanup actions planned or completed.
- As part of the Duwamish East Waterway Superfund site, the County will remove approximately 20,000 cubic yards of sediment in front of the Lander CSO in winter 2008-2009. EPA will oversee this cleanup activity. Plans for post cleanup monitoring are unknown.

[8] Brown and Caldwell 1999. *King County Department of Natural Resources Year 2000 CSO Plan Update Project, Sediment Management Plan.* Prepared by Anchor Environmental and Herrera Environmental Consultants in collaboration with King County. June 1999.

- The sediment cleanup at the Norfolk CSO included removal of 5,000 cubic yards of sediment in 1999, and an additional 100 cubic yards removed by Boeing in 2003. The last post-remedial monitoring was done in 2004. The Diagonal/Duwamish cleanup in 2003 included dredging and capping of seven acres of contaminated sediment along the Lower Duwamish River. Post-cleanup monitoring will continue for at least five years.[9]
- In the 1990s, the County installed a sediment cap near the old location of the Denny Way outfall. The cap was later discovered to be recontaminated. In 2002, the County constructed a new outfall to discharge further offshore. In 2006, primary treatment and disinfection began for most of the discharges from this CSO. Under an Ecology Agreed Order, the County completed an interim action to clean up contaminated sediments at this location in winter of 2007-2008. The interim action included removing 14,000 cubic yards of contaminated sediments. Some sediment monitoring will continue until 2012 to satisfy the National Marine Fisheries Service Biological Opinion.[10]

Sediment monitoring at CSO locations is a complex situation with many locations, some in different stages of cleanup under different authorities. At least 16 of these sites discharge into a Superfund cleanup site so source control and cleanup of individual sites need to be done in the context of a larger area. Cleanups done under CERCLA and MTCA may have short-term monitoring, but rely on other authorities, such as NPDES permits under the Clean Water Act to address long-term monitoring.

The NPDES permit for the CSO discharges has a role in assuring discharges are in compliance with the Sediment Management Standards. In this situation, it is necessary to coordinate these efforts with cleanup investigations and actions under state and federal authorities. With the complexity of the situation, Ecology needs a comprehensive report so that it can determine data gaps for sediment evaluation of these outfalls.

As a permit requirement, King County will provide a summary of existing data and activities that will provide for an assessment of potential sediment impacts from the CSO discharges. The report will include a summary of existing information on the volume and quality of the discharges, sediment data, description of status of cleanup sites and future monitoring plans, and steps taken to prevent recontamination of cleanup sites. After reviewing this report, Ecology will determine where data gaps exist and may require additional sediment monitoring at CSO locations within this permit cycle. Ecology will consider requirements for monitoring under the NPDES permit in coordination with other activities, such as the Superfund and MTCA remediation activities.

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[9] Ecology 2002. *Final Sediment Management Standards Cleanup Action Decision Duwamish/Diagonal CSO/SD.* Department of Ecology NWRO TCP. July 25, 2002.

[10] King County 2008. *Denny Way CSO and Elliott West CSO Treatment Facility, Post-Construction Sediment Monitoring Sampling and Analysis Plan.* Prepared by King County Department of Natural Resources and Parks Marine and Sediment Assessment Group. March 2008.

E. Description of the Receiving Water

West Point WWTP

The West Point WWTP outfall discharges to Puget Sound. Another nearby point source outfall includes the County's South Plant outfall. Significant nearby non-point sources of pollutants include stormwater runoff, industrial runoff, and maritime uses.

The ambient background data used for this permit includes the following from King County's CTD sampling station KSSK02, located at the West Point Outfall, 47º 39' 38" N, -122º 26' 50" W. The previous permit used ambient data from the Point Jefferson-King County sampling station KSBP01, approximately five nautical miles north of the outfall location. Ecology also used ambient monitoring data from monitoring station PSB003 for various calculations.

Table 25. West Point Ambient Background Data

Parameter	Value Used
Temperature (highest annual 1-DADMax)	15.7° C (at 1 m below surface)
pH (Maximum / Minimum)	7.0 su Min. / 8.2 su Max.
Salinity	29.6 psu

Alki CSO Treatment Plant

The Alki CSO treatment plant discharges to Puget Sound. Significant nearby non-point sources of pollutants include stormwater runoff.

The ambient background data used for this permit includes the following from King County sampling station LSKQ06. This station is located at the terminus of the Alki outfall. The location is 47º 34' 12.98" N and -122 º 25' 18.33" W. The County has recorded ten years of monthly data, with 0.5 meter vertical resolution. Ecology used this station for the proposed permit instead of the longer term but more distant station at Point Jefferson-King County sampling station KSBP01used for previous analyses.

Table 26. Alki Ambient Background Data

Parameter	Value Used
Temperature (highest annual 1-DADMax)	14.9° C (at 1 m below surface)
Salinity	29.5 psu

Carkeek CSO Treatment Plant

The Carkeek CSO treatment plant discharges to Puget Sound. Pipers Creek also discharges to Puget Sound and affects water quality in this area. Significant nearby non-point sources of pollutants include stormwater runoff.

The ambient background data used for this permit includes the following from King County's sampling station CK200P, located at the Carkeek Outfall, 47º 42' 45.54" N, -122º 23' 16.6" W. The County has recorded eight years of monthly casts, with 0.5 vertical resolution. Ecology used this station for the proposed permit instead of the longer term but more distant station at Point Jefferson-King County sampling station KSBP01used for previous analyses.

Table 27. Carkeek Ambient Background Data

Parameter	Value Used
Temperature (highest annual 1-DADMax)	14.6 C (at 1 m below surface)
Salinity	29.5 psu

Elliott West CSO Treatment Plant

The Elliott West CSO treatment plant outfall discharges to Elliott Bay. Significant nearby non-point sources of pollutants include stormwater runoff.

The ambient background data used for the proposed permit includes the following from King County sampling station LTED04. This station is located in Elliott Bay approximately one nautical mile south of the outfall location and is located in generally the same water mass as the outfall. The location is 47 º 36' 13.11" N and -122 º 21' 23.48" W.

Table 28. Elliott West Ambient Background Data

Parameter	Value Used
Temperature (highest annual 1-DADMax)	15.6 ^{o} C
Temperature (**some waterbodies have specific temperature criteria as assigned in Table 602)	16^{o} C
Salinity	28.7 psu

MLK/Henderson CSO Treatment Plant

The MLK/Henderson CSO treatment plant outfall discharges to the Duwamish waterway. Significant nearby non-point sources of pollutants include stormwater runoff and upstream discharges into the Green River.

The ambient background data used for this permit was assumed.

F. SEPA Compliance

Regulation exempts reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions that are no less stringent than state rules and regulations. The exemption applies only to existing discharges, not to new discharges.

III. PROPOSED PERMIT LIMITS

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (40 CFR 131.36).

- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants that were not reported in the permit application but that may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. If significant changes occur in any constituent of the effluent discharge, King County is required to notify Ecology (40 CFR 122.42(a)). King County may be in violation of the permit until Ecology modifies the permit to reflect additional discharge of pollutants.

A. Design Criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria.

West Point WWTP

The design criteria for the West Point WWTP are taken from *An Introduction to the WPTP, West Point Treatment Plant Manual* prepared by METRO dated August 1993 and are as follows:

Table 29. West Point WWTP Design Criteria

Parameter	Design Quantity
Monthly average flow (maximum month)	215 MGD
Average dry weather flow	110 MGD
Average annual flow	142 MGD
Average wet weather flow (non-storm)	133 MGD
Instantaneous peak flow	440 MGD
BOD_5 influent loading (average annual)	168,000 lbs./day
TSS influent loading (average annual)	181,000 lbs./day

Alki CSO Treatment Plant

The design criteria for this treatment facility are taken from *Facilities Plan for Alki Transfer/CSO Project* prepared by HDR Engineering, Inc. dated October 1992 and are as follows:

Table 30. Alki CSO Treatment Plant – Design Criteria

Parameter	Design Quantity
Peak storm water flow to Alki CSO Treatment Plant	65 MGD
TSS influent loading (average annual)	9,580 lbs./day

Carkeek CSO Treatment Plant

The design criteria for the Carkeek Storage and CSO Treatment Plant are taken from the *Facility Plan for the Carkeek Transfer/CSO Facilities Project* prepared by Brown and Caldwell Consulting Engineers dated December 1988 and are as follows:

Table 31. Carkeek CSO Treatment Plant – Design Criteria

Parameter	Design Quantity
Peak wet weather flow	20 MGD
TSS influent loading	5,100 lbs./day

EWCSO CSO Treatment Plant

The design criteria for the EWCSO Satellite CSO Treatment Plant are taken from the *Denny Way/Lake Union CSO Control Facilities Plan* dated July 1988 and are as follows:

Table 32. EWCSO Treatment Plant – Design Criteria

Parameter	Design Quantity
Tunnel Diameter	14’ 8”
Tunnel Length	6,200’
Total Volume	7.2 MG

MLK/Henderson CSO Treatment Plant

The design criteria for the MLK/Henderson CSO treatment plant are taken from the *Henderson/ML King CSO Control Facilities Plan* (approved March 5, 2002) and are as follows:

Table 33. MLK/Henderson CSO Treatment Plant – Design Criteria

Parameter	Design Quantity
Tunnel Diameter	14’ 8”
Tunnel Length	3,100’
Total Volume	4 MG

B. Technology-based Effluent Limits

Federal and state regulations define technology-based effluent limits for municipal wastewater treatment plants. These effluent limits are given in 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for municipal wastewater.

Chapter 173-221 WAC lists the following technology-based limits for pH, fecal coliform, BOD_5, and TSS:

Table 34. Technology-based Limits (West Point WWTP)

Parameter	Limit
pH	The pH must measure within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
$CBOD_5$ (concentration)	Average Monthly Limit is the most stringent of the following: - 25 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
Chlorine	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L

Ecology derived the technology-based monthly average limit for chlorine from standard operating practices. The Water Pollution Control Federation's *Chlorination of Wastewater* (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after fifteen minutes of contact time. See also Metcalf and Eddy, *Wastewater Engineering, Treatment, Disposal and Reuse*, Third Edition, 1991. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/L chlorine limit on a monthly average basis. According to WAC 173-221-030(11)(b), the corresponding weekly average is 0.75 mg/L.

West Point WWTP

Monthly $CBOD_5$ effluent mass loadings (lb/day) were calculated as the maximum monthly design flow (215 MGD) x concentration limit (25 mg/L) x conversion factor (8.34) = 44827.5 lbs/day $CBOD_5$. Rounding the number to 3 significant figures, the monthly organic loading limit is **44,800 lb/day $CBOD_5$**.

The weekly average effluent mass loading is calculated as (40/25) x monthly loading = 71724 lbs/day $CBOD_5$. Rounding the number to 3 significant figures, the weekly average organic loading limit is **71,700 lb/day $CBOD_5$**.

Monthly total suspended solids effluent mass loading (lb/day) were calculated as the maximum monthly design flow (215 MGD) x concentration limit (30 mg/L) x conversion factor (8.34) = 53793 lb/day TSS. Rounding the number to 3 significant figures, the monthly solids loading limit is **53,800 lb/day TSS**.

The weekly average effluent mass loading is calculated as (45/30) x monthly loading = 80689.5 lb/day TSS. Rounding the number to 3 significant figures, the weekly average solids loading limit is **80,700 lb/day TSS**.

WAC 173-221-050 subsection (3) states that, "for domestic wastewater facilities which receive flows from combined sewer, Ecology shall decide on a case-by-case basis whether any attainable percent removal can be defined during wet weather." The West Point WWTP receives a more dilute influent during wet weather due to a collection system that combines both sanitary sewage and storm water. A dilute influent can make the 85% removal criteria for $CBOD_5$ and TSS difficult to achieve. Ecology has determined that the percent removal requirements for $CBOD_5$ and TSS will remain at 80% during the months of November through April (wet weather months) when the influent is likely to have lower than normal concentrations of both $CBOD_5$ and TSS. However, the concentration and mass loading limits as stated above remain in effect year-round.

The federal CSO statute requires as one of the Nine Minimum Controls (NMC, No. 4) that the West Point WWTP maximizes flows to the plant during the wet season in order to minimize CSO discharges. In the decision to reduce the removal requirement to 80% during the wet season, Ecology has recognized that removal efficiencies may be compromised in order to accomplish the more important goal of maximizing flow to the treatment plant and minimizing CSO discharges.

Ecology recognizes that increased flows to the treatment plant over time may impact the achievable removal efficiency during wet weather conditions. Ecology will evaluate the percent removal requirement during the wet season during each permit cycle and establish the removal requirement based on recent plant performance data.

CSO Treatment Plants

The specific technology-based limits that apply to CSOs are the nine minimum controls. Also, at-site treatment of CSOs must provide "primary treatment" which is defined in WAC 173-245-020(16) as "any process which removes at least 50% of the total suspended solids from the waste stream, and discharges less that 0.3 ml/L/hr of settleable solids." Additionally, Ecology's *Criteria for Sewage Works Design*[11], clarifies that the 50% removal is to be assessed on an annual average basis.

Table 35. Technology & Guidance-based Limits for CSO Treatment Plants

Parameter	Limit
TSS [a]	50% removal, annual average
Settleable Solids [a]	0.3 ml/L/hr, annual average
Fecal Coliform Bacteria [b]	400 /100 mL

[a] WAC 173-245-020(16)
[b] Washington State Department of Ecology, Criteria for Sewage Works Design, December 1998, p. C3-21.

Alki, Carkeek, Elliott West, and MLK/Henderson CSO Treatment Plants

The County's 4 CSO treatment plants provide primary treatment which consists of sedimentation of solids and disinfection of the effluent prior to discharge. In order to comply with Washington State regulation, the limit for all CSO treatment plants is based on overall percent removal of

[11] Washington State Department of Ecology, Criteria for Sewage Works Design, December 1998, p. C3-18.

total suspended solids of 50% or greater. The overall percent removal on an annual basis includes the removal achieved at the CSO treatment plant and that achieved at the West Point WWTP.

Ecology evaluates compliance of the CSO treatment plant effluent with the 0.3 ml/l/hr of settleable solids limit based on a yearly average due to the intermittent and highly variable operation of the CSOs. Ecology based the monthly limit of 1.9 ml/l/hr of settleable solids monthly maximum on empirical data. This limit is considered reasonable and achievable based on the intermittent and highly variable operation of the CSO treatment plants.

Ecology's technical guidance document (aka *Criteria for Sewage Works Design*), under CSO Section C3-3.3.8, states that an appropriate performance criteria for end-of-the-pipe CSO treatment for fecal coliform is 400 cfu/100 mL. For the Carkeek facility, the permit application states that the disinfection system is effective in meeting the current fecal coliform limit. In fact, the maximum monthly geometric mean for 2005-2006 and 2006-2007, were 32 and 75 cfu/100mL, respectively. For the Alki facility, the average monthly fecal coliform levels for November 2006, December 2006, and January 2007 were 3, 54, and 8 cfu/100 mL, respectively. The guidance-based monthly geometric mean limit of 400/100mL for fecal coliform on discharge days for Alki and Carkeek is appropriate and achievable based on historic performance. For EWCSO & MLK/Henderson CSO, the guidance-based limit was previously used in the West Point Permit (Modification June 20, 2005).

C. Surface Water Quality-based Effluent Limits

The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

Numerical Criteria for the Protection of Aquatic Life and Recreation

Numerical water quality criteria are listed in the water quality standards for surface waters (Chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State (EPA 1992). These criteria are designed to protect humans from exposure to pollutants linked to cancer and other disease, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative Criteria
Narrative water quality criteria (for example, WAC 173-201A-240(1); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

Antidegradation
The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three tiers of protection (described below) for surface waters of the state.

Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions. Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities. Tier III prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

This facility must meet Tier I requirements.

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in Chapter 173-201A WAC.

Ecology's analysis described in this section of the fact sheet demonstrates that the existing and designated uses of the receiving water will be protected under the conditions of the proposed permit.

Mixing Zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the discharge does not interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and use no more than 25% of the available width of the water body for dilution. Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derive any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 10 means the effluent is 10% and the receiving water is 90% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life **acute** criterion is based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Each aquatic life **chronic** criterion is based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions**. These assumptions include:**

- **A 70-year lifetime of daily exposures.**
- **An ingestion rate for fish or shellfish measured in kg/day.**
- **An ingestion rate of two liters/day for drinking water.**
- **A one-in-one-million cancer risk for carcinogenic chemicals.**

This permit authorizes an acute mixing zone, surrounded by a chronic mixing zone around the point of discharge (WAC 173-201A-400). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

1. **Ecology must specify both the allowed size and location in a permit.**

   The proposed permit specifies the size and location of the allowed mixing zone.

2. **The facility must fully apply "all known, available, and reasonable methods of prevention, control and treatment" (AKART) to its discharge.**

   Ecology has determined that the treatment provided at King County's West Point WWTP meets the requirements of AKART (see "Technology-based Limits").

3. **Ecology must consider critical discharge conditions.**

   Surface water quality-based limits are derived for the waterbody's critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

   Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed

effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology uses the water depth at mean lower low water (MLLW) for marine waters. Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: http://www.ecy.wa.gov/biblio/92109.html.

West Point WWTP

King County used the following critical conditions to model the discharge:

- Water depth at MLLW of 230 feet.
- Density profile with a difference of about 23 sigma-t units between 230 feet and the surface.
- 50th percentile current speeds of 0.264 m/sec at 60 m for chronic and human health mixing zones.
- 10th or 90th percentile current speeds of 0.086 m/sec and 0.428 m/sec at 60 m, respectively for acute mixing zone.
- Maximum average monthly effluent flow of 204 MGD for chronic and human health non-carcinogen.
- Annual average flow of 142 MGD for human health carcinogen.
- Maximum daily flow of 401 million gallons per day (MGD) for acute mixing zone.
- 1 DAD MAX Effluent temperature of 15.7 degrees C.

Ambient data at critical conditions in the vicinity of the outfall was taken from King County's CTD sampling station KSSK02, located at the West Point Outfall conducted in 2005.

CSO Treatment Plants

The methodology to determine the acute and chronic design flows for intermittent CSO discharges is summarized in Ecology's permit writer's manual as:

For critical condition scenarios at the acute boundary, the flow rate to use is the highest equivalent twenty-four hour average for the past three years during the season in which the critical condition is likely to occur. If plant influent flows are expected to increase during the life of the permit, the highest daily maximum flow must be estimated.

For critical condition scenarios at the chronic boundary, the flow rate to use is the highest equivalent monthly average flow (total volume of all discharge events in a month divided by the total hours of discharge in that month) for the past three years during the season in which the critical condition is likely to occur. If plant influent flows are expected to increase during the life of the permit, the highest average monthly flow must be estimated. For average condition (human health-based) scenarios, the flow rate to use is the annual equivalent average flow based on data provided in the permit application or DMR analysis.

This is the same methodology that has previously been applied to assessing dilution at all of the CSO treatment plants, as summarized below.

Table 36. CSO Dilution Assessment Criteria

CSO INTERMITTENT DISCHARGE METHOD	
ZONE OF ACUTE CRITERIA EXCEEDANCE	The event with the highest equivalent twenty-four hour average (total volume of event divided by total hours of event).
MIXING ZONE (CHRONIC) & NON-CARC. HUMAN HEALTH	The highest equivalent monthly average over the last three years of operation (total volume of all discharge events in a month divided by the total hours of discharge in that month).
CARCINOGENIC HUMAN HEALTH	The highest equivalent annual average flow over the last three years of operation (total volume of all discharge events in a year divided by the total days of discharge in that year).

Alki CSO Treatment Plant

King County used the following critical conditions to model the CSO discharges:

- Event with highest 24-hour discharge = 52 MGD (November 2006).
- 10^{th} or 90^{th} percentile current speeds of 5.5 and 43 cm/sec for acute mixing zone.
- Highest Equivalent monthly discharge = 37 MGD (November 2006).
- 50^{th} percentile current speeds used for chronic mixing zones.

Ambient data at critical conditions in the vicinity of the outfall were taken from King County sampling station LSKQ06. This station is located at the terminus of the Alki CSO outfall at 47° 34' 12.98" N and -122° 25' 18.33" W. The County has recorded ten years of monthly casts, with 0.5 meter vertical resolution. This station was used instead of the longer term but more distant station at Point Jefferson-King County sampling station KSBP01 that was used for previous analyses.

Carkeek CSO Treatment Plant

King County used the following critical conditions to model the discharge:

- Event with highest 24-hour discharge = 7.6 MGD (December 2006)
- 10^{th} or 90^{th} percentile current speeds of 2 and 15 cm/sec for acute mixing zone.
- Highest Equivalent monthly discharge = 4.8 MGD (November 2005)
- 50^{th} percentile current speeds of 5 cm/sec for chronic mixing zones.
- Highest equivalent Annual Average Flow = 2.3 MGD (June 2005 – May 2006).

Ambient data at critical conditions in the vicinity of the outfall was taken from King County's CTD sampling station CK200P, located at the Carkeek Outfall, 47° 42' 45.54" N, -122° 23' 16.6" W. The County has recorded eight years of monthly CTD casts, with 0.5 vertical resolution. This station was used instead of the longer term but more distant station at Point Jefferson-King County sampling station KSBP01 that was used for previous analyses.

Elliott West CSO Treatment Plant

King County used the following critical conditions to model the discharge:

- Event with highest 24-hour discharge = 80 MGD (November 2006).
- 10^{th} or 90^{th} percentile current speeds of 2.5 and 10 cm/sec for acute mixing zone.
- Highest Equivalent monthly discharge = 52 MGD.
- 50^{th} percentile current speeds used for chronic mixing zones.

Ambient data at critical conditions in the vicinity of the outfall were taken from King County sampling station LTED04. This station is located in Elliott Bay approximately one nautical mile south of the outfall location and is located in generally the same water mass as the outfall. The location is 47° 36' 13.11" N and -122° 21' 23.48" W.

MLK/Henderson CSO Treatment Plant

Ecology used the following critical conditions to model the discharge:

- 50^{th} percentile current speeds of 21cm/sec for chronic.
- 10^{th} or 90^{th} percentile current speeds of 7.8 and 39 cm/sec for acute mixing zone.
- Acute Design Flow 77 MGD.
- Chronic Design Flow = 25 MGD.

Ambient data at critical conditions in the vicinity of the outfall were taken from the Henderson/MLK Predesign Report.

4. Supporting information must clearly indicate the mixing zone would not:

- **Have a reasonable potential to cause the loss of sensitive or important habitat.**
- **Substantially interfere with the existing or characteristic uses.**
- **Result in damage to the ecosystem.**
- **Adversely affect public health.**

Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of being discharged.

The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than two seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing.

Ecology reviewed the above information, the specific information on the characteristics of the discharge, the receiving water characteristics and the discharge location. Based on this review, Ecology concluded that the discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem, or adversely affect public health if the permit limits are met.

5. The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.

Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant and concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone if permit limits are met.

6. The size of the mixing zone and the concentrations of the pollutants must be minimized.

At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. Because tidal currents change direction, the plume orientation within the mixing zone changes. The plume rises through the water column as it mixes, therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology typically uses the expected 95^{th} percentile pollutant concentration, the 90^{th} percentile background concentration, the centerline dilution factor, and the lowest flow

occurring once in every ten years to perform the reasonable potential analysis. In the case of the West Point WWTP, the maximum daily pollutant concentrations were used in the reasonable potential calculations, not the 95th percent values.

Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit. Diagrams for the mixing zones are presented at the end of this section.

7. Maximum size of mixing zone.

The authorized mixing zone does not exceed the maximum size restriction.

8. Acute Mixing Zone.

- **The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.**

  Ecology determined the acute criteria will be met at 10% of the distance of the chronic mixing zone at the ten-year low flow.

- **The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**

  As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

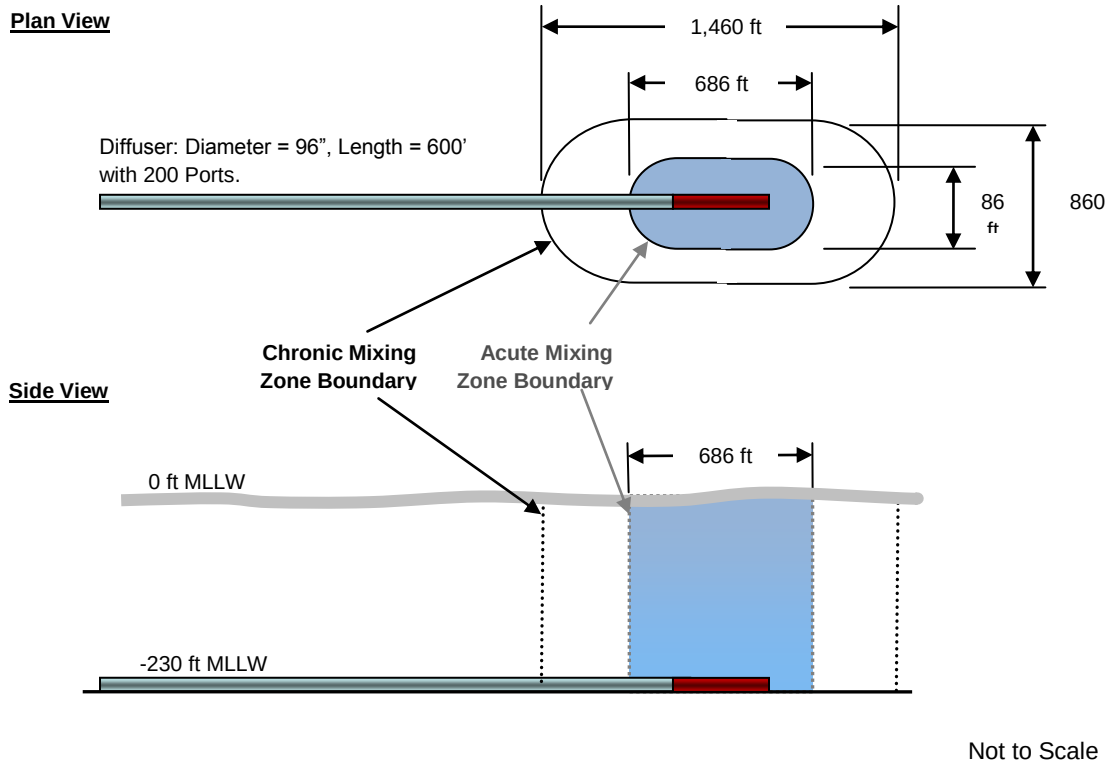
- **Comply with size restrictions.**

  The mixing zone authorized for this discharge complies with the size restrictions published in Chapter 173-201A WAC.

9. Overlap of Mixing Zones.

This mixing zone does not overlap another mixing zone.

Figure 5. West Point's WWTP's Mixing Zone



Not to Scale

Figure 6. Alki's Mixing Zone

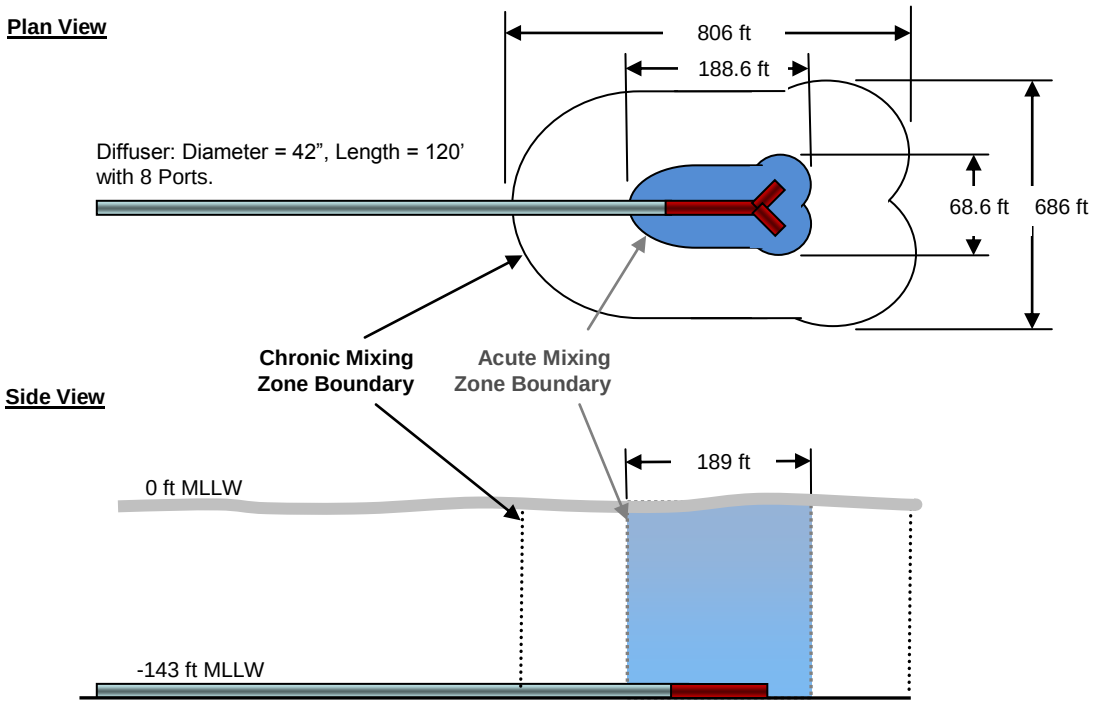
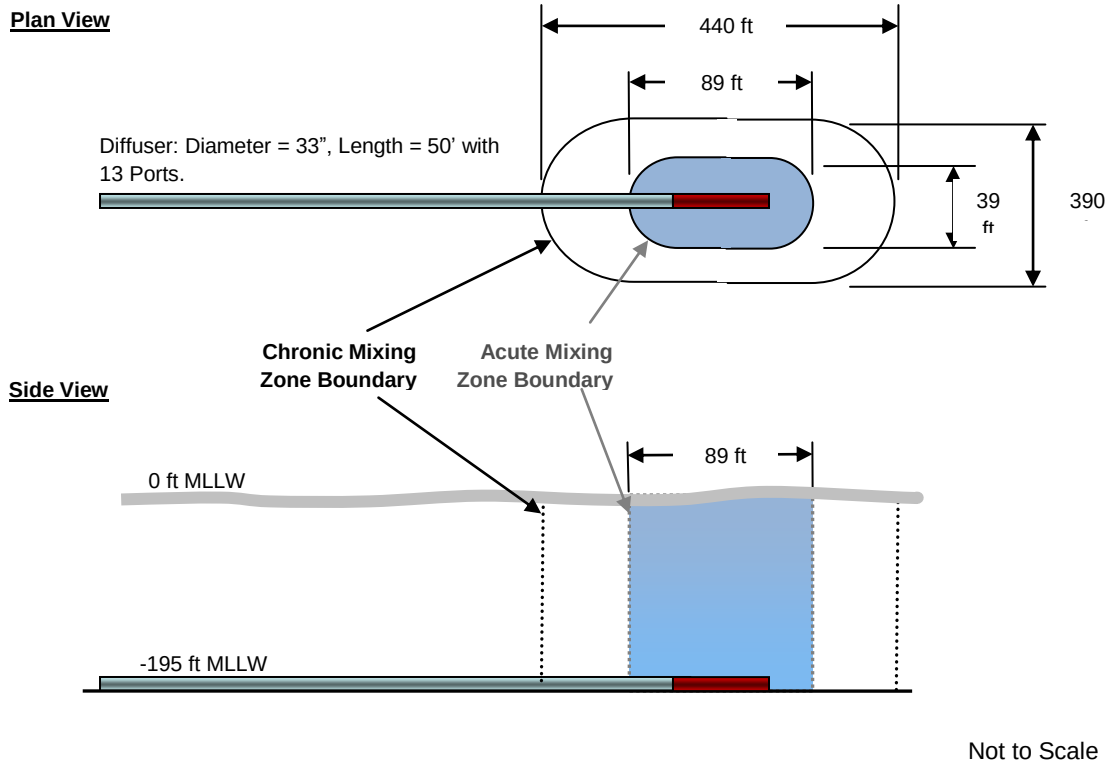


Figure 6. Alki's Outfall Mixing Zones. Not to Scale

Figure 7. Carkeek's Mixing Zone



Not to Scale

Figure 8. Elliott West Mixing Zone

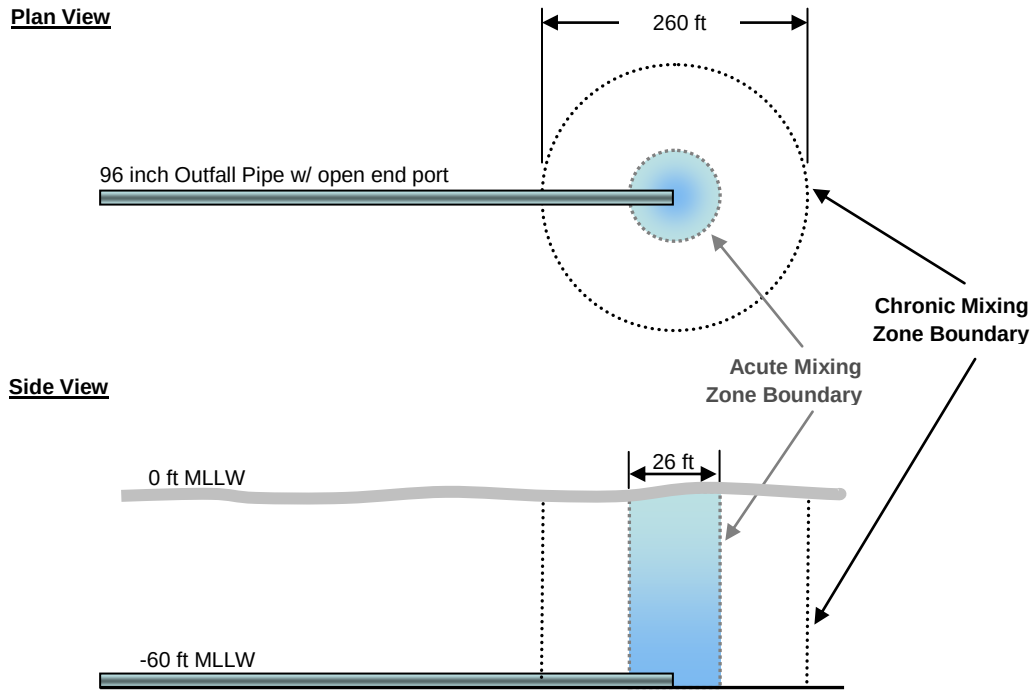
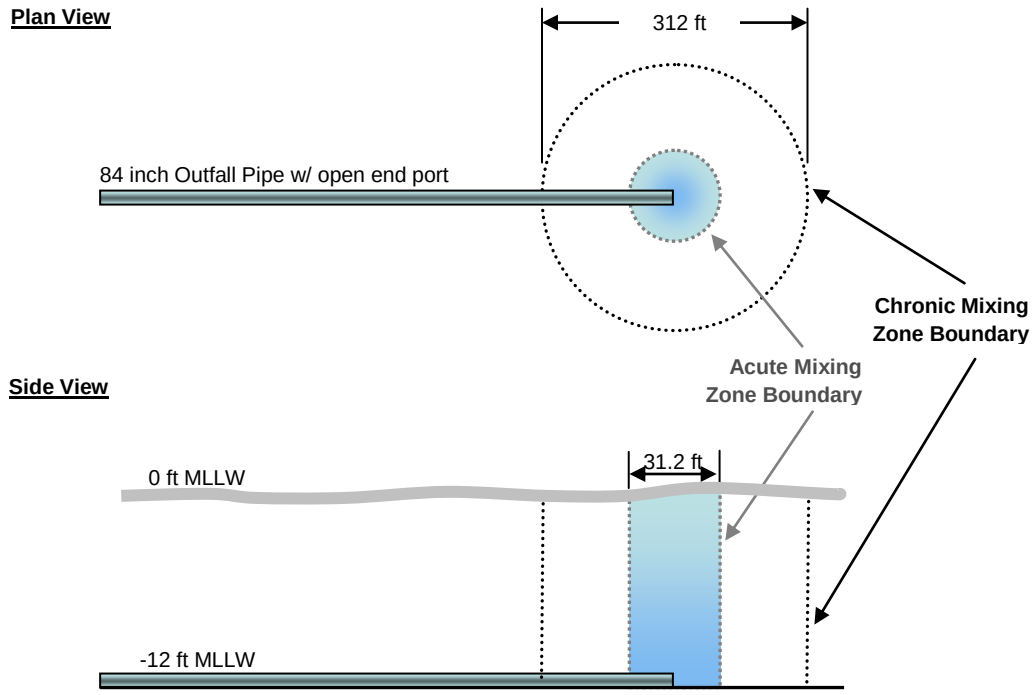


Figure 9. MLK/Henderson Mixing Zones



D. Designated Uses and Surface Water Quality Criteria

Applicable designated uses and surface water quality criteria are defined in Chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). Criteria applicable to this facility's discharge are summarized below.

Marine Discharges:

- **Aquatic life uses** are designated using the following general categories. All indigenous fish and non-fish aquatic species must be protected in waters of the state.

  (a) **Extraordinary quality** salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

  (b) **Excellent quality** salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

  (c) **Good quality** salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

  (d) **Fair quality** salmonid and other fish migration.

  Alki Storage and CSO Treatment Plant, Carkeek Storage and CSO Treatment Plant, **and West Point WWTP** discharge to Extraordinary Marine waters. The Aquatic Life Uses and associated criteria for extraordinary marine waters are identified below.

Table 37. Aquatic Life Uses and Associated Criteria (Alki, Carkeek, and West Point)

Extraordinary Quality	
Temperature Criteria – Highest 1D MAX	13°C (55.4°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	7.0 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH Criteria	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.2 units.

- To protect **shellfish harvesting**, fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.

- The **recreational uses** are primary contact recreation and secondary contact recreation.

For Alki Storage and CSO Treatment Plant, Carkeek Storage and CSO Treatment Plant, and West Point WWTP discharges to Puget Sound, the recreational uses are identified as primary contact, as shown below.

Table 38. Recreational Uses (Alki, Carkeek, and West Point)

Recreational Use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies /100 mL.

- The **miscellaneous marine water uses** are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

The **Denny/Elliott West CSO Storage and Treatment Plant** discharges to Excellent Marine Waters. The Aquatic Life Uses and associated criteria for excellent marine waters are identified below.

Table 39. Aquatic Life Uses and Associated Criteria (Denny/Elliott West CSO Storage and Treatment Plant)

Excellent Quality	
Temperature Criteria – Highest 1D MAX	16°C (60.8°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	6.0 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH Criteria	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

- To protect **shellfish harvesting**, fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.

- The **recreational uses** are primary contact recreation and secondary contact recreation.

For the Denny/Elliott West Storage and CSO Treatment Plant discharge to Elliott Bay receiving water, the recreational uses are identified as primary contact, as identified below.

Table 40. Recreational Uses (Denny/Elliott West Storage and CSO Treatment Plant)

Recreational Use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies /100 mL.

- The **miscellaneous marine water uses** are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

Freshwater Discharges:
The **MLK/Henderson Storage and CSO Treatment Plant** discharges to the Duwamish River. This freshwater system has an aquatic life use of rearing and migration only and a recreation classification of secondary contact. The Aquatic Life Uses and associated criteria for rearing and migration only are identified below.

- Aquatic Life Uses are designated based on the presence of, or the intent to provide protection for, the key uses. All indigenous fish and non-fish aquatic species must be protected in waters of the state in addition to the key species. The Aquatic Life Uses for this receiving water are identified below.

Table 41. Aquatic Life Uses & Associated Criteria (MLK/Henderson Storage and CSO Treatment Plant)

Salmonid Rearing and Migration Only	
Temperature Criteria – Highest 7DAD MAX	17.5°C (63.5°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	6.5 mg/L
Turbidity Criteria	• 10NTU over background when the background is 50 NTU or less; or • A 20 percent increase in turbidity when the background turbidity is more than 50 NTU
Total Dissolved Gas Criteria	Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection
pH Criteria	pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units

- The recreational uses are extraordinary primary contact recreation, primary contact recreation, and secondary contact recreation. The recreational uses for this receiving water are identified below.

Table 42. Recreational Uses and Associated Criteria (MLK/Henderson Storage and CSO Treatment Plant)

Recreational Use	**Criteria**
Secondary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 200 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 400 colonies /100 mL

- The **water supply uses** are domestic, agricultural, industrial, and stock watering.

- The **miscellaneous freshwater use**s are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

E. Evaluation of Surface Water Quality-based Effluent Limits for Numeric Criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants—their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biological oxygen demand (BOD) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

With technology-based controls (AKART), predicted pollutant concentrations in the discharge exceed water quality criteria. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones by Chapter 173-201A WAC.

West Point WWTP Outfall
The diffuser at Outfall 001 is 600 feet long with a total of 200 ports varying between 4.5-5.75-inch diameter ports. The mean lower low water (MLLW) depth and the diffuser depth are 230 feet. Ecology obtained this information from the Dilution Ratio Study Report submitted on June 30, 2008.

Alki CSO Treatment Plant Outfall
The Alki outfall ends in a multi-port diffuser at a depth of 43.6m (143 ft) MLLW. The diffuser is 120 feet in length, with eight 12-inch diameter diffuser ports. The first six ports are directed to alternating sides of the outfall. The final two ports are formed from a wye at the end of the outfall.

Carkeek CSO Treatment Plant Outfall
The Carkeek outfall ends in a multi-port diffuser at a depth of 59.5m (195 ft) MLLW. The diffuser is 50 feet in length, with 13 diffuser ports varying between 5.5-inches and 10.0-inches in diameter. The ports are equally spaced on alternating sides. A port diameter of 6.57 inches corresponds to the average port area.

Elliott West CSO treatment Plant Outfall
The Elliott West outfall ends in a single-port diffuser at a depth of 60 ft MLLW. The flow is discharged horizontally through a 90-inch port, located approximately 490 ft offshore. Note that the duckbill valve has been removed from the discharge.

MLK/Henderson CSO Treatment Plant Outfall
The Henderson/MLK flow is discharged horizontally through an 84-inch pipe, located at the Norfolk outfall. The Norfolk outfall is located on the north bank of the Duwamish River approximately at river km 10.5. The 84-inch diameter outfall approaches the river bank at a 90-degree angle to the river flow and is flush with the bank. There is a flap gate on the end of the pipe that is assumed to be completely open during discharge events.

Chronic Mixing Zones – Fresh Water - MLK/Henderson
WAC 173-201A-400(7)(a) specifies that mixing zones must not extend in a downstream direction from the discharge ports for a distance greater than 300 feet plus the depth of water over the discharge ports or extend upstream for a distance of over 100 feet, not utilize greater than **25%** of the flow, and not occupy greater than **25%** of the width of the water body. The horizontal distance of the chronic mixing zone is 312 feet. The mixing zone extends from the river bottom to the top of the water surface.

Acute Mixing Zones – Fresh Water – MLK/Henderson
WAC 173-201A-400(8)(a) specifies that in rivers and streams a zone where acute toxics criteria may be exceeded must not extend beyond 10% of the distance towards the upstream and downstream boundaries of the chronic zone, not use greater than **2.5%** of the flow and not occupy greater than **25%** of the width of the water body.

The horizontal distance of the acute mixing zone is 31.2 feet. The mixing zone extends from the river bottom to the top of the water surface. The dilution factor is based on this distance.

Chronic Mixing Zones – Estuarine - *West Point WWTP, Alki, Carkeek, and Elliott West CSO Treatment Plants*
WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports as measured during MLLW.

West Point WWTP

The horizontal distance of the chronic mixing zone is 430 feet. The mixing zone extends from the seabed to the top of the water surface.

Alki CSO Outfall

The horizontal distance of the chronic mixing zone is 340 feet. The mixing zone extends from the seabed to the top of the water surface.

Carkeek CSO Outfall

The horizontal distance of the chronic mixing zone is 395 feet. The mixing zone extends from the seabed to the top of the water surface.

Elliott West CSO Outfall

The horizontal distance of the chronic mixing zone is 260 feet. The mixing zone extends from the seabed to the top of the water surface.

Acute Mixing Zones – Estuarine - *West Point WWTP, Alki, Carkeek, and Elliott West CSO Treatment Plants*
WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone. The horizontal distances of the acute mixing zones for the West Point, Alki, Carkeek, and Elliott West outfalls are 43, 34, 39.5, and 26 feet, respectively. The mixing zones extend from the seabed to the top of the water surfaces.

Dilution Factors

Ecology provided a very thorough review of the County's data, dilution factors, and modeling in August 2008 and January 2009. Ecology verified that the County used conservative assumptions and provided rigorous modeling to obtain dilution factors. There are differences between the dilution factors used in the previous permit and the dilution factors used in the proposed permit as described in the below table. Ecology revised the dilution factors due to: 1) new and improved computer models, 2) closer ambient monitoring stations to each outfall; and 3) more accurate effluent flow data. The dilution factors in the proposed permit are considered more up-to-date and representative than in the previous permit. Ecology notes that four of the dilution factors increased and four dilution factors decreased from the previous permit.

Table 43. Comparison of Dilution Factors

Outfall	Chronic Mixing Zone (feet)	Zone of Acute Criteria Exceedance (feet)	Proposed Chronic Dilution Ratio	Current Chronic Dilution Ratio	Proposed Acute Dilution Ratio	Current Acute Dilution Ratio
West Point WWTP	430 (131 m)	43 (13.1m)	181:1	153:1	28:1	32:1
Alki CSO	340 (104 m)	34 (10.4 m)	61:1	120:1	17.5:1	20:1
Carkeek CSO	395 (120 m)	39.5 (12.0 m)	146:1	197:1	93:1	38:1
Elliott West CSO	260 (79 m)	26 (7.9 m)	11:1	7.2:1	7.8:1	3.4:1
MLK/Henderson CSO	312 (95 m)	31.2 (9.5 m)	10.3:1	10.3:1	1.9:1	1.9:1

The dilution factors for Alki and MLK/Henderson CSOs were either lower or unchanged compared to the previous dilution factors. For the Elliott West outfall, both the chronic and acute dilution factors are higher than the previous dilution factors. For Carkeek, the acute dilution factor is higher but the chronic dilution factor is lower than the previous permit. For the West Point outfall, the chronic dilution factor is higher but the acute dilution factor is lower than the previous permit. Specific information regarding changes to the dilution factors is described below.

1. **General Comment:** The changes in dilution factors are attributed to use of localized density profiles and currents, but more importantly the use of new and improved models. The old dilution factors were based upon Updated Merge (UM) model with the DOS Plumes interface. UM was a 2-dimensional model. The new assessment used the 3-dimensional Updated Merge Model (UM3) with the Windows Visual Plumes interface and the Robert Snyder Baumgartner (RSB) model for farfield predictions. UM3 is a 3-dimensional model and more accurately represents the discharge plume than UM2. RSB is a better model for alternating ports.

2. **Elliott West CSO**. Both the chronic and acute dilution factors are higher than the previous numbers. The previous analysis used flows in the range of 30-300 MGD. The new analysis limited the flow to 80 MGD (acute) and 52 MGD (chronic) based upon three years of data (2003-2006). The lower flows, in addition to using improved predictive models and nearby ambient data, are responsible for the higher estimated dilution factors.

3. **Carkeek CSO**. The reason for the higher acute dilution factor can be attributed to the use of improved modeling technique and use of nearby ambient data.

4. **West Point**. The predicted acute dilution factor was lower and the chronic dilution factor was higher compared to the previous analysis. New improved models and nearby ambient data are the reasons for the changes in the dilution factors.

King County determined the dilution factors that occur within these zones at the critical conditions using Visual Plumes (UM3 and RSB model components). The proposed dilution factors are listed in Tables 44 - 48:

Table 44. Dilution Factors (DF) for West Point WWTP Outfall

Criteria	Acute	Chronic
Aquatic Life	28:1	181:1
Human Health, Carcinogen		330:1
Human Health, Non-carcinogen		330:1

Table 45. Dilution Factors (DF) for Alki CSO Outfall

Criteria	Acute	Chronic
Aquatic Life	17.5:1	61:1
Human Health, Carcinogen		61:1
Human Health, Non-carcinogen		61:1

Table 46. Dilution Factors (DF) for Carkeek CSO Outfall

Criteria	Acute	Chronic
Aquatic Life	93:1	146:1
Human Health, Carcinogen		146:1
Human Health, Non-carcinogen		146:1

Table 47. Dilution Factors (DF) for Elliot West CSO Outfall

Criteria	Acute	Chronic
Aquatic Life	7.8:1	11:1
Human Health, Carcinogen		11:1
Human Health, Non-carcinogen		11:1

Table 48. Dilution Factors (DF) for MLK/Henderson CSO Outfall

Criteria	Acute	Chronic
Aquatic Life	1.9:1	10.3:1
Human Health, Carcinogen		10.3:1
Human Health, Non-carcinogen		10.3:1

Ecology determined the impacts of dissolved oxygen deficiency, temperature, pH, fecal coliform, chlorine, ammonia, metals, nutrients and other toxics as described below, using the dilution factors in the above tables. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

BOD_5 - West Point WWTP

With technology-based limits, this discharge results in a small amount of BOD loading relative to the large amount of dilution in the receiving water at critical conditions. Technology-based limits will ensure that dissolved oxygen criteria are met in the receiving water.

BOD_5 - Alki CSO, Carkeek CSO, Elliott West CSO, and MLK/Henderson *CSO Treatment Plants*

There is no technology-based effluent limitation for BOD_5 for intermittent primary treated discharges such as for CSO treatment plants. Because these are CSO discharges, the BODs will be more dilute than typical wastewater. Therefore, Ecology did not place effluent limits for BOD_5 for CSO treatment plants in the proposed permit.

Temperature - (West Point WWTP)

The state temperature standards (WAC 173-201A-200-210 and 600-612) include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15).
- Supplemental spawning and rearing season criteria (September 15 to June 15).
- Incremental warming restrictions.
- Protections against acute effects.

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

- Annual summer maximum and supplementary spawning/rearing criteria.

  Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1)(c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

  Some waters have an additional threshold criterion to protect the spawning and incubation of salmonids (9°C for char and 13°C for salmon and trout) [WAC 173-201A-602, Table 602]. These criteria apply during specific date-windows.

  The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum temperature (7-DADMax). The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax).

- Incremental warming criteria

  The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(i)-(ii), 210(1)(c)(i)-(ii)]. The incremental warming criteria apply at the edge of the chronic mixing zone.

At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition.

When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25% or less of the critical flow. This is because the fully mixed effect on temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- Temperature Acute Effects

  Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33°C; unless a dilution analysis indicates ambient temperatures will not exceed 33°C 2-seconds after discharge.

  General lethality and migration blockage: Measurable (0.3°C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C.

  Lethality to incubating fish: Human actions must not cause a measurable (0.3°C) warming above 17.5°C at locations where eggs are incubating.

- Temperature Chronic Effects

  1. Annual summer maximum.

  Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum, the supplementary spawning criterion, and the incremental warming criteria at the edge of the chronic mixing zone during critical condition(s). No reasonable potential exists to exceed the temperature criterion where:

  (Criterion + 0.3) > Criterion + [($T_{effluent95}$ – Criterion)/DF].

  (13 + 0.3) > 13 + [(23.3 – 13)/181].
  13.3 > 13.06

  Therefore, the proposed permit does not include a temperature limit. The permit requires additional monitoring of effluent and ambient temperatures. Ecology will reevaluate the reasonable potential during the next permit renewal.

2. Incremental warming criteria

Some waters are naturally incapable of meeting their assigned threshold temperature criteria. At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition.

When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25 percent or less of the critical flow. This is because the fully mixed effect on temperature will be only a fraction (0.075°C or less) of the 0.3°C cumulative allowance for all human sources combined.

West Point WWTP reported a maximum effluent temperature of 23.3°C on their NPDES application. Using the dilution ratio of 181:1 (receiving water : effluent) and maximum daily temperature of 14.7°C for the receiving water and 23.3°C for the effluent, the predicted maximum daily temperature inside the dilution zone is ((181x14.7)+(1x23.3))/(181+1) = 14.75°C. Thus, under the worst case scenario, the effluent discharge from this facility results in warming of the ambient temperature by 0.05°C, which is less than the allowable warming temperature of 0.3°C.

Since the discharge does not have a potential to violate the water quality standards for temperature in the receiving water, Ecology placed no limits in the permit for effluent temperature. To acquire ambient temperature and effluent temperature data, the proposed permit requires the West Point WWTP to continue to monitor these temperatures. Based on existing temperature data for the receiving water and effluent, the permit does not require an effluent temperature limit. The need for a limit will be evaluated during the next permit cycle.

- Temperature Acute Effects

1. Instantaneous lethality to passing fish.

The upper 99th percentile daily maximum effluent temperature must not exceed 33°C; unless a dilution analysis indicates ambient temperatures will not exceed 33°C two seconds after discharge. The upper 99th percentile daily maximum effluent temperature prior to discharge is less than 33°C. Therefore, there is no instantaneous lethality for passing fish.

2. General lethality and migration blockage.

Measurable (0.3°C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C. The receiving water conditions are listed in Table 8 of the fact sheet. The listed temperature values meet these criteria.

pH – (West Point WWTP, Alki CSO, Carkeek CSO, and Elliott West CSO)

Compliance with the technology-based limits of 6.0 to 9.0 will assure compliance with the water quality standards of surface waters because of the high buffering capacity of marine water. For calculations, refer to Appendix F.

pH – (MLK/Henderson CSO)

Ecology modeled the impact of the effluent pH on the receiving water using the calculations from EPA, 1988, and the chronic dilution factor of 10.3. The receiving water input variables used were assumed and the effluent characteristics were assumed to be similar to the West Point WWTP effluent, as ambient receiving water data and MLK/Henderson effluent characteristics (temp, pH, alkalinity) were not available.

Using assumed values, Ecology predicts no violation of the pH criteria under critical conditions. Therefore, the proposed permit includes technology-based effluent limits for pH.

Fecal Coliform

The potential for wastewater treatment plant discharges to contribute to a violation of the water quality standard for fecal coliform is evaluated based on a 30-day geometric mean. For plants that discharge continuously, the geometric mean is calculated using the sample result for fecal coliform for all days for which there are samples results during the month. Inherent in this method is the assumption that sampled days are representative of non-sampled days. For treatment plants that discharge intermittently with water quality-based limits, the calculation method is modified to take into account non-discharge days. The 30-day geometric mean for intermittent discharge is calculated using the sample result for fecal coliform for all days for which a discharge occurs during the month. For those days for which there is no discharge, a fecal coliform of one is assumed for the purpose of allowing a geometric mean to be calculated. (The formula used to calculate a geometric mean produces an erroneous result if any of the values used in the calculation are zero.)

For CSO treatment plants that have technology/guidance-based limits for fecal coliform, the calculation method only includes discharge days. Non-discharge days are not included in the calculation, as the technology/guidance-based limit applies only to when discharges are occurring and the reasoning that the plant is capable of achieving the technology/guidance limit.

Fecal Coliform – West Point WWTP

Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based (weekly maximum effluent) limit of 400 organisms per 100 ml and a dilution factor of 181.

Ambient data from monitoring station PSB003 were used in this analysis.

With the dilution of 181:1 and the technology-based limit of 400/100mL, and an ambient fecal concentration of 1/100 mL, Ecology calculated a fecal coliform concentration at the edge of the mixing zone boundary of 3/100mL, well below the water quality standard of 14 colonies/100 mL. Therefore, the proposed permit includes the technology-based effluent limit for fecal coliform bacteria.

Fecal Coliform - Alki CSO Treatment Plant

Ecology modeled the numbers of fecal coliform by simple mixing analysis using the guidance-based limit of 400 organisms per 100 ml and a dilution factor of 61.

Ambient data from monitoring station LSKQ06 were used in this analysis.

With the dilution of 61:1 and the guidance-based limit of 400/100mL, and an assumed ambient fecal concentration of 3/100 mL, Ecology calculated a fecal coliform concentration at the edge of the mixing zone boundary of 9/100mL, which is below the water quality standard of 14 colonies/100 mL. Therefore, the proposed permit includes the technology-based effluent limit for fecal coliform bacteria, on a monthly basis, since it is protective of water quality and more stringent than the water-quality based limit.

Fecal Coliform - (Carkeek CSO Treatment Plant)

Ecology modeled the numbers of fecal coliform by simple mixing analysis using the guidance-based limit of 400 organisms per 100 ml and a dilution factor of 146.

Ambient data from monitoring station CK200P were used in this analysis.

With the dilution of 146:1 and the guidance-based limit of 400/100mL, and an assumed ambient fecal concentration of 3/100 mL, Ecology calculated a fecal coliform concentration at the edge of the mixing zone boundary of 6/100mL, which is below the water quality standard of 14 colonies/100 mL. Therefore, the proposed permit includes the guidance-based effluent limit for fecal coliform bacteria, on a monthly basis, since it is protective of water quality and more stringent than the water quality-based limit.

Fecal Coliform – (Elliott West CSO Treatment Plant)

The previous permit used the guidance-based limit of 400/100mL. Ecology modeled the numbers of fecal coliform by simple mixing analysis using the guidance-based limit of 400 organisms per 100 ml and a dilution factor of 11.

Ambient data from monitoring station LTED04 were used in this analysis.

With the dilution of 11:1 and the guidance-based limit of 400/100mL, and an assumed ambient fecal concentration of 3/100 mL, Ecology calculated a fecal coliform concentration at the edge of the mixing zone boundary of 36/100 mL, which is above the water quality standard of 14 colonies/100 mL. However, the water quality standards allow for, "not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL." During the last permit cycle, the EWCSO treatment plant had difficulty meeting the end-of-pipe 400/100 mL standard. Since it is possible that the guidance based limit may not be protective of water-quality, the proposed permit includes a water quality-based effluent limit of 154 organisms/100 ml. The water quality-based limit is the product of dilution ratio (11) and the water quality standard 14/100 mL.

Since the EWCSO treatment plant has had difficulty meeting permit limits, Ecology has established interim and final fecal coliform limits. The interim limit is the guidance-based limit of 400cfu/100mL and lasts for two wet seasons and the final limit is the water-quality based limit of 154 cfu/100 mL.

Fecal Coliform - (MLK/Henderson CSO Treatment Plant)

Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 10.3.

With the dilution of 10.3:1 and the guidance-based limit of 400/100mL, and an assumed ambient fecal concentration of 3/100 mL, Ecology calculated a fecal coliform concentration at the edge of the mixing zone boundary of 39/100mL, which is below the water quality standard of 200 colonies/100 mL (for freshwater recreational secondary contact). Therefore, the proposed permit includes the guidance-based effluent limit for fecal coliform bacteria, on a monthly basis, since it is protective of water quality and more stringent than the water quality-based limit.

Toxic Pollutants

Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

West Point WWTP

The following toxic pollutants are present in West Point WWTP's discharge: ammonia, arsenic, cadmium, chlorine, chromium, copper, lead, mercury, nickel, silver, and zinc. Ecology conducted a reasonable potential analysis (See Appendix F) on these parameters to determine whether it would require effluent limits in this permit.

Ecology assumed zero for ambient concentrations for the above-listed pollutants. Ecology requires King County (Condition S13 of the proposed permit) to provide ambient data or to collect background concentrations near the point of discharge. This information may result in a permit modification or additional limits in the next permit renewal.

Ecology determined that ammonia, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (Appendix F) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Ecology derived effluent limits for the toxic pollutant chlorine, determined to have a reasonable potential to cause a violation of the water quality standards. Ecology calculated effluent limits using methods from EPA, 1991 as shown in Appendix F.

Ecology used new dilution modeling results to determine new total residual chlorine limits for the proposed permit. Ecology derived the new limits based on the state water quality standards of 13 µg/L for acute and 7.5 µg/L for chronic along with an acute dilution factor of 28:1 and a chronic dilution factor of 181:1 (refer to Appendix F, Water Quality Permit-based Limit Calculation). The resulting permit limits are an average monthly total residual chlorine limit of 139 µg/L and a maximum daily total residual chlorine limit of 364 µg/L.

The resultant effluent limits are as follows:

Chlorine 139 µg/L (average monthly) and 364 µg/L (Maximum Daily Limit)

Alki CSO Treatment Plant

The following toxic pollutants are present in Alki CSO treatment plant's discharge: ammonia, arsenic, cadmium, chlorine, chromium, copper, lead, mercury, nickel, silver, and zinc. Ecology conducted a reasonable potential analysis (See Appendix F) on these parameters to determine whether it would require effluent limits in this permit.

King County supplied ambient data on arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc. Ecology used the 90% concentrations for these pollutants in the reasonable potential analysis. For the next permit cycle, Ecology requires King County (Condition S18 of the proposed permit) to either provide ambient monitoring data or collect background concentrations near the point of discharge. This information may result in a permit modification or additional limits in the next permit renewal.

Ecology determined that ammonia, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (Appendix F) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Ecology derived effluent limits for the toxic pollutant chlorine, determined to have a reasonable potential to cause a violation of the water quality standards. Ecology calculated effluent limits using methods from EPA, 1991 as shown in Appendix F.

The resultant effluent limit is as follows:

Chlorine 234 µg/L (Maximum Daily Limit)

Carkeek CSO Treatment Plant

The following toxic pollutants are present in Carkeek CSO treatment plant's discharge: ammonia, arsenic, cadmium, chlorine, chromium, copper, lead, nickel, silver, and zinc. Ecology conducted a reasonable potential analysis (See Appendix F) on these parameters to determine whether it would require effluent limits in this permit.

King County supplied ambient data on arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc. Ecology used the 90% concentrations for these pollutants in the reasonable potential analysis. For the next permit cycle, Ecology requires King County (Condition S18 of the proposed permit) to either provide ambient monitoring data or collect background concentrations near the point of discharge. This information may result in a permit modification or additional limits in the next permit renewal.

Ecology determined that ammonia, arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (Appendix F) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Ecology derived effluent limits for the toxic pollutant chlorine, determined to have a reasonable potential to cause a violation of the water quality standards. Ecology calculated effluent limits using methods from EPA, 1991 as shown in Appendix F.

The calculated water-quality-based limit for chlorine based on the revised mixing zone is 1,209 µg/L (Maximum Daily Limit). The technology-based limit for chlorine is more stringent than the water-quality-based limit at 750 µg/L (Maximum Daily Limit). The previous permit included a water-quality based limit of 490 µg/L based the dilution factor in that permit. The anti-backsliding provision under the federal regulations [CFR 122.44(l)] requires that the chlorine limit be based on the more stringent limit established in the previous permit since it has been shown to be technologically achievable.

Elliott West CSO Treatment Plant

The following toxic pollutants are present in Elliott West CSO treatment plant's discharge: ammonia, arsenic, cadmium, chlorine, chromium, copper, lead, mercury, nickel, silver, and zinc. Ecology conducted a reasonable potential analysis (See Appendix F) on these parameters to determine whether it would require effluent limits in this permit.

King County supplied ambient data on arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, and zinc. Ecology used the 90% concentrations for these pollutants in the reasonable potential analysis. For the next permit cycle, Ecology requires King County (Condition S18 of the proposed permit) to either provide ambient monitoring data or collect background concentrations near the point of discharge. This information may result in a permit modification or additional limits in the next permit renewal.

Ecology determined that ammonia, arsenic, cadmium, chromium, nickel, silver, and zinc pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (Appendix F) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Ecology derived an effluent limit for the toxic pollutant chlorine, determined to have a reasonable potential to cause a violation of the water quality standards. Ecology calculated effluent limits using methods from EPA, 1991 as shown in Appendix F.

The proposed chlorine effluent limit is based on the revised dilution factor which is based on ambient monitoring station located closer to the outfall than the previous permit.

The reasonable potential analysis also indicated that copper had a reasonable potential to violate water quality standards. Because the analysis was only based on one discharge event with five flow proportional samples, Ecology is requiring the County to sample for priority pollutants, including copper, during the next permit cycle to confirm results prior to setting a limit. After two years of copper testing, Ecology will review the results to further determine compliance with the water quality standards.

The resultant effluent limits are as follows:

Table 49. EWCSO Water Quality-based Limits

Parameter	Maximum Daily Limit (µg/L)
Chlorine	104
Copper	38*

* No limit included in permit. Highest detected concentration not included in calculation (i.e. considered anamolous). The copper value of 45.8 µg/L was used.

MLK/Henderson CSO Treatment Plant

The exiting permit required three priority pollutant sampling events at MLK/Henderson CSO treatment plant. However, the auto-sampler for the plant was not installed until January 28, 2008. Therefore, no toxic pollutants data from the MLK/Henderson CSO treatment plant's discharge is available. The proposed permit requires the County to perform priority pollutant sampling to address this data gap.

Ecology derived an effluent limit for the toxic pollutant chlorine, determined to have a reasonable potential to cause a violation of the water quality standards. Ecology calculated effluent limits using methods from EPA, 1991 as shown in Appendix F.

The resultant effluent limit is as follows:

Chlorine 39 µg/L (Maximum Daily Limit)

F. Whole Effluent Toxicity (West Point WWTP only)

The water quality standards for surface waters forbid discharge of effluent that causes toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

- *Acute toxicity tests measure mortality as the significant response* to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.
- *Chronic toxicity tests measure various sublethal toxic responses*, such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure organism survival.

Ecology-accredited WET testing laboratories use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff knows about WET testing and how to calculate an NOEC, LC_{50}, EC_{50}, IC_{25}, etc. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (http://www.ecy.wa.gov/biblio/9580.html), which is referenced in the permit. Ecology

recommends that King County send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

Acute WET testing conducted during effluent characterization had less than 65% survival in 100% effluent in the fathead minnow acute test (RMAR0963) on a sample taken July 16, 2007. No other recent acute tests had any acute toxicity; however, this one test result means that West Point must have another effluent characterization for acute WET and receive an acute WET limit if survival less than 65% occurs in 100% effluent again.

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization.

- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased. King County may demonstrate to Ecology that effluent toxicity has not increased, by performing additional WET testing after the process or material changes have been made.

WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water chronic toxicity. The proposed permit will not impose a chronic WET limit. King County must retest the effluent before submitting an application for permit renewal.

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization.

- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased. King County may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing after the process or material changes have been made.

G. Human Health

Washington’s water quality standards include 91 numeric human health-based criteria that Ecology must consider when writing NPDES permits. These criteria were established in 1992 by the U.S. EPA in its National Toxics Rule (40 CFR 131.36). The National Toxics Rule allows states to use mixing zones to evaluate whether discharges comply with human health criteria.

Ecology determined the effluent may contain chemicals of concern for human health, based on (1) the facility’s status as an EPA major discharger, and (2) data or information indicating regulated chemicals occur in the discharge.

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. For West Point WWTP, Alki CSO Treatment Plant, Carkeek CSO Treatment Plant, and the Elliott West CSO Storage and Treatment Plant, the evaluation showed that (1) the discharge has no reasonable potential to cause a violation of water quality standards, and (2) an effluent limit is not needed.

Priority pollutant data was not collected for MLK/Henderson and therefore, Ecology could not assess human health criteria.

H. Sediment Quality

The aquatic sediment standards (Chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. http://www.ecy.wa.gov/programs/tcp/smu/sediment.html

Ecology determined that the West Point WWTP discharge has potential to cause a violation of the sediment quality standards because:

- Past sediment testing near the outfall has shown some evidence of toxicity to benthic organisms.

- Past sediment testing near CSO locations has shown exceedances of the Sediment Management Standard requiring these sites to become cleanup sites.

The proposed permit includes a condition requiring King County to:

- Continue sediment and effluent testing to investigate the source and extent of toxicity at the West Point WWTP outfall.

- Provide a report that summarizes activities and existing data for sediment quality at the CSO locations. After reviewing the report, Ecology will determine if additional sediment monitoring is needed to address data gaps at the CSO locations.

I. Ground Water Quality Limits

The ground water quality standards (Chapter 173-200 WAC) protect beneficial uses of ground water. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

King County does not discharge wastewater to the ground. No permit limits are required to protect ground water.

J. Comparison of Effluent Limits With the Previous Permit

Table 50. Comparison of Effluent Limits (West Point WWTP)

Parameter	Basis of Limit	Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
		Average Monthly	Average Weekly	Average Monthly	Average Weekly
Carbonaceous Biochemical Oxygen Demand (5-day)	Technology	25 mg/L, 44,800 lb/day	40 mg/L, 71,700 lb/day	25 mg/L, 44,800 lb/day	40 mg/L, 71,700 lb/day
Total Suspended Solids	Technology	30 mg/L, 53,800 lb/day	45 mg/L, 80,700 lb/day	30 mg/L, 53,800 lb/day	45 mg/L, 80,700 lb/day
Fecal Coliform Bacteria	Technology	200/100 mL	400/100 mL	200/100 mL	400/100 mL
pH	Technology	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0			
Parameter	**Basis of Limit**	**Previous Effluent Limits: Outfall # 001**		**Proposed Effluent Limits: Outfall # 001**	
		Average Monthly	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Total Residual Chlorine	Water Quality-Based	160 µg/L (285 lb/day)	420 µg/L	139 µg/L	364 µg/L

Table 51. Comparison of Effluent Limits (Alki CSO Treatment Plant)

Previous Effluent Limits: Outfall # 051				Proposed Effluent Limits: Outfall # 051		
Parameter	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**
Total Suspended Solids Removal Efficiency, %	NA	50%	NA	NA	50%	NA
Settleable Solids (mL/L/hr)	1.9 Maximum	0.3	NA	1.9 Maximum	0.3	NA
Fecal Coliform Bacteria	1,700/100mL	NA	NA	400/100mL	NA	NA
Number of events per year	NA	NA	29/yr	NA	NA	29/yr
Average Vol. per yr, MG	NA	NA	108 MG/yr	NA	NA	108 MG/yr
pH	NA	NA	NA	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		
Parameter	**Average Monthly**		**Maximum Daily Averages**	**Average Monthly**		**Maximum Daily Averages**
Total Residual Chlorine	NA		290 µg/L	NA		234 µg/L

Table 52. Comparison of Effluent Limits (Carkeek CSO Treatment Plant)

Previous Effluent Limits: Outfall # 046				Proposed Effluent Limits: Outfall # 046		
Parameter	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**
Total Suspended Solids Removal Efficiency, %	NA	50%	NA	NA	50%	NA
Settleable Solids (mL/L/hr)	1.9 Maximum	0.3	NA	1.9 Maximum	0.3	NA
Fecal Coliform Bacteria	2,800/100mL	NA	NA	400/100mL	NA	NA
Number of events per year	NA	NA	10/yr	NA	NA	10/yr
Average Vol. per yr, MG	NA	NA	46 MG/yr	NA	NA	46 MG/yr
pH	NA	NA	NA	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		
Parameter	**Average Monthly**		**Maximum Daily Averages**	**Average Monthly**		**Maximum Daily Averages**
Total Residual Chlorine	NA		490 µg/L	NA		490 µg/L

Table 53. Comparison of Effluent Limits (Elliott West CSO Treatment Plant)

Previous Effluent Limits: Outfall # 027				Proposed Effluent Limits: Outfall # 027		
Parameter	**Discharge Limits (Monthly**	**Discharge Limits (Annual Avg.)**	**Discharge Limits (Long-Term Avg.)**	**Discharge Limits (Monthly**	**Discharge Limits (Annual Avg.)**	**Discharge Limits (Long-Term Avg.)**
Total Suspended Solids Removal Efficiency, %	Report	50%	NA	Report	50%	NA
Settleable Solids (mL/L/hr)	1.9 Maximum	0.3	NA	1.9 Maximum	0.3	NA
Fecal Coliform Bacteria	400/100mL	NA	NA	Interim 400/100 mL Final 154/100 mL	NA	NA
Number of events per year	Report	Report	NA	Report	Report	NA
Average Vol. per yr, MG	Report	Report	NA	Report	Report	NA
pH	NA	NA	NA	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		
Parameter	**Average Monthly**		**Maximum Daily Averages**	**Average Monthly**		**Maximum Daily Averages**
Total Residual Chlorine	NA		44 µg/L	NA		104 µg/L
Copper	NA		NA	Monitor		

Table 54. Comparison of Effluent Limits (MLK/Henderson Treatment Plant)

Previous Effluent Limits: Outfall # 044				Proposed Effluent Limits: Outfall # 044		
Parameter	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**	**Discharge Limits (Monthly Avg)**	**Discharge Limits (Annual Avg)**	**Discharge Limits (Long-Term Avg)**
Total Suspended Solids Removal Efficiency, %	Report	50%	NA	NA	50%	NA
Settleable Solids (mL/L/hr)	1.9 Maximum	0.3	NA	1.9 Maximum	0.3	NA
Fecal Coliform Bacteria	400/100mL	Report	NA	400/100 mL	Report	NA
Number of events per year	Report	Report	NA	NA	Report	NA
Average Vol. per yr, MG	Report	Report	NA	NA	Report	NA
pH	NA	NA	NA	Daily Minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0		
Parameter	**Average Monthly**		**Maximum Daily Averages**	**Average Monthly**		**Maximum Daily Averages**
Total Residual Chlorine	NA		39 µg/L	NA		39 µg/L

IV. MONITORING REQUIREMENTS

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-09) for secondary treatment facilities.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Biosolids monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The proposed permit requires King County to monitor for sediments, whole effluent toxicity, and priority pollutants to further characterize the effluent. These pollutant(s) could have a significant impact on the quality of the surface water.

A. Lab Accreditation

Ecology requires that all monitoring data (with the exception of certain parameters) must be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* Ecology accredited the laboratory at this facility for total alkalinity, ammonia, BOD/CBOD, COD, total residual chlorine, dissolved oxygen, nitrate, nitrite, TKN, orthophosphate, pH, phosphorus, total persulfate, total solids, TDS, TSS, TVS, sulfate, turbidity, total coli, and fecal coliform.

V. OTHER PERMIT CONDITIONS

A. Reporting and Record Keeping

Ecology based permit condition S3 on our authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

B. Prevention of Facility Overloading

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require King County to take the actions detailed in proposed permit requirement S.4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow.

C. Operation and Maintenance (O&M)

The proposed permit contains Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that King County takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

D. Pretreatment

Duty to Enforce Discharge Prohibitions

This provision prohibits the publicly owned treatment works (POTW) from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer.

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants which causes "Pass-through" or "Interference." This general prohibition is from 40 CFR §403.5(a). Appendix B of this fact sheet defines these terms.
- The second section reinforces a number of specific State and Federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the POTW may not accept certain wastes, which:
  - Are prohibited due to dangerous waste rules.
  - Are explosive or flammable.

- Have too high or low of a pH (too corrosive, acidic or basic).
- May cause a blockage such as grease, sand, rocks, or viscous materials.
- Are hot enough to cause a problem.
- Are of sufficient strength or volume to interfere with treatment.
- Contain too much petroleum-based oils, mineral oil, or cutting fluid.
- Create noxious or toxic gases at any point.

40 CFR Part 403 contains the regulatory basis for these prohibitions, with the exception of the pH provisions which are based on WAC 173-216-060.

- The third section of pretreatment conditions reflects state prohibitions on the POTW accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:
  - Cooling water in significant volumes.
  - Stormwater and other direct inflow sources.
  - Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Ecology delegated authority to King County for permitting, monitoring, and enforcement over industrial users discharging to their treatment system to provide more direct and effective control of pollutants. Ecology oversees the delegated Industrial Pretreatment Program to assure compliance with federal pretreatment regulations (40 CFR Part 403) and categorical standards and state regulations (Chapter 90.48 RCW and Chapter 173-216 WAC).

As sufficient data becomes available, King County must, in consultation with Ecology, reevaluate its local limits in order to prevent pass-through or interference. If any pollutant causes pass-through or interference, or exceeds established sludge standards, King County must establish new local limits or revise existing local limits as required by 40 CFR 403.5. In addition, Ecology may require revision or establishment of local limits for any pollutant that causes a violation of water quality standards or established effluent limits, or that causes whole effluent toxicity.

Ecology may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern.

E. Solid Waste Control

To prevent water quality problems, the facility is required in permit Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of biosolids from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 70.95J RCW, Chapter 173-308 WAC "Biosolids Management," and Chapter 173-350 WAC "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction of the King County Health Department.

Requirements for monitoring biosolids and record keeping are included in this permit. This information will be used by Ecology to develop or update local limits and is also required under 40 CFR 503.

F. Spill Plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution if accidentally released. Ecology can require a facility to develop best management plans to prevent this accidental release [Section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080].

King County developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the facility to update this plan and submit it to Ecology.

G. Combined Sewer Overflows

In accordance with RCW 90.48.480 and Chapter 173-245 WAC, proposed permit Condition S.18 requires King County to submit an annual Combined Sewer Overflow (CSO) report and to update its CSO reduction plan at the time of permit renewal. Monthly CSO reports are also required. Additional requirements include a flow and waste load assessment, a compliance schedule for CSO reduction projects, additional pollutant sampling at MLK/Henderson CSO Treatment Plant, implementation and documentation of the nine minimum controls, a receiving water characterization, and sediment data reporting.

Post-construction monitoring is also required. The post-construction monitoring includes a monitoring plan and a data report. The specific details of the monitoring plan are purposely not prescriptive. Ecology is awaiting the EPA guidance on post-construction monitoring plans to be issued. Therefore, this permit has been written in a manner to allow for the guidance to be incorporated.

H. Outfall Evaluation

The proposed permit requires King County to conduct an outfall inspection and submit a report detailing the findings of that inspection (Condition S.15). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

I. General Conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual municipal NPDES permits issued by Ecology.

VI. PERMIT ISSUANCE PROCEDURES

A. Permit Modifications

Ecology may modify this permit to impose numerical limits, if necessary, to comply with water quality standards for surface waters, with sediment quality standards, or with water quality

standards for ground waters, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

B. Proposed Permit Issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of five (5) years.

VII. REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. *National Toxics Rule.* Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001.

1988. *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling.* USEPA Office of Water, Washington, D.C.

1985. *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water*. EPA/600/6-85/002a.

1983. *Water Quality Standards Handbook.* USEPA Office of Water, Washington, D.C.

Tsivoglou, E.C., and J.R. Wallace.

1972. *Characterization of Stream Reaeration Capacity*. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

2006. *Permit Writer's Manual.* Publication Number 92-109 (http://www.ecy.wa.gov/biblio/92109.html)

Laws and Regulations (http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/wastewater/index.html)

Water Pollution Control Federation.

1976. *Chlorination of Wastewater*.

Wright, R.M., and A.J. McDonnell.

1979. *In-stream Deoxygenation Rate Prediction.* Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A—PUBLIC INVOLVEMENT INFORMATION

Ecology proposes to reissue a permit to King County's West Point WWTP. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Application on August 4, 2008, and August 11, 2008, in *The Seattle Times* to inform the public about the submitted application and to invite comment on the reissuance of this permit.

Ecology placed a Public Notice of Draft on November 14, 2008, in *The Seattle Times and Seattle Post Intelligencer* to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice –

- Tells where copies of the draft permit and fact sheet are available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Asks people to tell us how well the proposed permit would protect the receiving water.
- Invites people to suggest fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Tells how to request a public hearing about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting* which is available on our website at http://www.ecy.wa.gov/biblio/0307023.html.

You may obtain further information from Ecology by telephone, 425-649-7201, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

The primary author of this permit and fact sheet is Mark Henley, P.E.

APPENDIX B—GLOSSARY

1-DMax or **1-day maximum temperature—**The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or **7-day average of the daily maximum temperatures—**The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute Toxicity—The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART—An acronym for "all known, available, and reasonable methods of prevention, control and treatment."

Ambient Water Quality—The existing environmental condition of the water in a receiving water body.

Ammonia—Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual Average Design Flow (AADF)—The average of the daily flow volumes anticipated to occur over a calendar year.

Average Monthly Discharge Limit—The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)—Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5—Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass—The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine—Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity—The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)—The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection - Without Sampling—A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling—A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite Sample—A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity—Clearing, grading, excavation, and any other activity which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous Monitoring—Uninterrupted, unless otherwise noted in the permit.

Critical Condition—The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor (DF)—A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report—A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria—Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample—A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Industrial Wastewater—Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility—A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limit—The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum Day Design Flow (MDDF)—The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum Month Design Flow (MMDF)—The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum Week Design Flow (MWDF)—The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method Detection Level (MDL)—The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Minor Facility—A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone—An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)—The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH—The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Peak Hour Design Flow (PHDF)—The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak Instantaneous Design Flow (PIDF)—The maximum anticipated instantaneous flow.

Quantitation Level (QL)—A calculated value five times the MDL (method detection level).

Reasonable Potential —A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible Corporate Officer—A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Technology-based Effluent Limit—A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)—Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to receiving waters may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Solid Waste—All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

State Waters—Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater—That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset—An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit—A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into receiving waters.

APPENDIX C—WEST POINT WWTP APPLICATION DATA SUMMARY

Pollutant	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	# of Samples	Analytical Method	ML/MDL
ANTIMONY	0.95	ug/l	1.396	lb/d	0	ug/l	0	lb/d	17	EPA 200.8	0.5
ARSENIC	0.002	mg/l	1.764	lb/d	0.001	mg/l	1.693	lb/d	15	EPA 200.7	0.025
BERYLLIUM	0	ug/l	0	lb/d	0	ug/l	0	lb/d	17	EPA 200.8	0.2
CADMIUM	0.1	ug/l	0.088	lb/d	0.1	ug/l	0.088	lb/d	17	EPA 200.7	2
CHROMIUM	0.001	mg/l	0.97	lb/d	0.001	mg/l	0.744	lb/d	17	EPA 200.7	0.003
COPPER	0.017	mg/l	14.996	lb/d	0.011	mg/l	9.766	lb/d	17	EPA 200.7	0.004
LEAD	0.001	mg/l	1.217	lb/d	0.001	mg/l	0.745	lb/d	17	EPA 200.7	0.02
MERCURY	0.008	ug/l	0.006	lb/d	0	ug/l	0	lb/d	17	EPA 245.1	0.05
NICKEL	0.004	mg/l	3.731	lb/d	0.003	mg/l	2.755	lb/d	17	EPA 200.7	0.005
SELENIUM	0	ug/l	0	lb/d	0	ug/l	0	lb/d	17	EPA 200.8	1.5
SILVER	0.91	ug/l	0.803	lb/d	0.439	ug/l	0.319	lb/d	17	EPA 200.7	0.4
THALLIUM	0	ug/l	0	lb/d	0	ug/l	0	lb/d	17	EPA 200.8	0.2
ZINC	0.044	mg/l	38.813	lb/d	0.035	mg/l	30.791	lb/d	18	EPA 200.7	0.005
CYANIDE	0	mg/l	0	lb/d	0	mg/l	0	lb/d	19	SM 4500-CN-I-E	0.005
TOTAL PHENOLIC COMPOUNDS	0.45	mg/l	318.6	lb/d	0.029	mg/l	22.3	lb/d	17	EPA 420.2	0.005
HARDNESS (AS CaCO3)	-	-	-	-	-	-	-	-	-	-	-
VOLATILE ORGANIC COMPOUNDS											
ACROLEIN	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	5
ACRYLONITRILE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	5
BENZENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
BROMOFORM	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
CARBON TETRACHLORIDE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
COLORBENZENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
CHLOROBIDBROMO-METHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
CHLOROETHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
2-CHLORO-ETHYLVINYL ETHER	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
CHOLOROFORM	8.21	ug/l	5.66	lb/d	4.34	ug/l	3.49	lb/l	10	EPA 624	1
DICHLOROBROMO-METHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
1,1-DICHLOROETHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
TRANS-1,2-DICHLORO-ETHYLENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
1,1-DICHLOROPROPANE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
ETHYLBENZENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
METHYL BROMIDE	-	-	-	-	-	-	-	-	-	-	-
METHYL CHLORIDE	-	-	-	-	-	-	-	-	-	-	-
METHYLENE CHLORIDE	9.1	ug/l	12.85	lb/d	0.91	ug/l	1.29	lb/l	10	EPA 624	39457
1,1,2,2-TETRACHLORO-ETHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
TETRACHLORO-ETHYLENE	1.4	ug/l	1.133	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
TOLUENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	10	EPA 624	1
1,1,1-TRICHLOROETHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	10	EPA 624	1
1,1,2-TRICHLOROETHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	10	EPA 624	1
TRICHLOROETHYLENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	10	EPA 624	1
VINYL CHLORIDE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	10	EPA 624	1
ACID-EXTRACTABLE COMPOUNDS											
P-CHLORO-M-CRESOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.94-1.9
2-CHLOROPHENOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.94-1.9
2,4-DIMETHYLPHENOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.94
4,6-DINITRO-O-CRESOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	1.9
2,4-DINITROPHENOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.94-1.9
2-NITROPHENOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.94
4-NITROPHENOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.94-1.9
PENTA CHLOROPHENOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.95
PHENOL	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.19-3.8

Pollutant	Max. Daily Discharge				Average Daily Discharge				# of Samples	Analytical Method	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units			
BASE NEUTRAL COMPOUNDS											
2,4,6-TRICHLOROPHENOL	0	ug/l	0	lbd/	0	ug/l	0	lb/d	9	EPA3520c/625	1.9-3.8
ACENAPHTHENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	9	EPA3520c/625	0.19-.38
ACENAPHTYLENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	9	EPA3520c/625	0.28-5.7
ANTHRACENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	9	EPA3520c/625	0.28-0.58
BENZIDINE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	9	EPA3520/625	0.11-0.23
BENZO(A) ANTHRACENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	9	EPA3520c/625	0.28-0.58
BENZO(A)PYRENE	0	ug/l	0	lb/d	0	ug/l	0	lb/l	9	EPA3520c/625	0.47-0.97
3.4 BENZO-FLUORANTHENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.7-1.5
BENZO(GHI)PERYLENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.95
BENZO(K)FLUORANTHENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.75-1.5
BIS (2-CHLORO ETHOXY) METHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.95
BIS (2-CHLOROETHYL)-ETHER	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520/625	0.28-0.58
BIS (2-CHLOROISO-PROPYL) ETHER	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.94-1.9
BIS (2-ETHYLHEXYL) PHTHALATE	3.03	ug/l	2.19	lb/d	2.07	ug/l	1.72	lb/d	9	EPA3520/625	0.09-0.19
4-BROMOPHENYL PHENYL ETHER	0	ugl	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.19-0.38
BUTYL BENZYL PHTHALATE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-0.58
2-CHLORO NAPHTHALENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-0.58
4-CHLORPHENYL PHENYL ETHER	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-0.58
CHRYSENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-0.58
DI-N-BUTYL PHTHALATE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.97
DI-N-OCTYL PHTHALATE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPS3520c/625	0.28-0.58
DIBENZO(A,H) ANTHRACENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.75-1.6
1,2-DICHLORO BENZENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-1.0
1,3-DICHLORO BENZENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-1.0
1,4-DICHLORO BENZENE	10.1	ug/l	3.42	lb/d	6.96	ug/l	2.59	lb/d	9	EPA3520c/625	0.28-1.0
3,3-DICHLORO BENZIDINE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.97
DIETHYL PHTHALATE	1.6	ug/l	1.11	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.95
DIMETHYL PHTHALATE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.19-0.38
2,4-DINITROTOLUENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.19-0.38
2,6-DINITROTOLUENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.19-0.38
1,2-DIPHENYLHYDRAZINE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.94-1.9
FLUORANTHENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-057
FLUORENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-0.58
HEXACHLORO BENZENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-058
HEXACHLOROBUTADIENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.97
HEXACHLOROCYCLO-PENTADIENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPS3520c/625	0.47-0.97
HEXA CHLOROETHANE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.97
INDENO(1,2,3-CD) PYRENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c.625	0.47-0.97
ISOPHORONE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.95
NAPHTHALENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.75-106
NITROBENZENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.97
N-NITROSODI-N-PROPYLAMINE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.95
N-NITROSODI-METHYLAMINE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	1.9-3.8
N-NITROSODI-PHENYLAMINE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.47-0.95
PHENANTHRENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-0.58
PYRENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-0.58
1,2,4-TRICHLOROBENZENE	0	ug/l	0	lb/d	0	ug/l	0	lb/d	9	EPA3520c/625	0.28-0.58

APPENDIX D—WEST POINT WWTP DISCHARGE MONITORING REPORT SUMMARY TABLES

Discharge Monitoring Data—January 1, 2004 to June 30, 2008

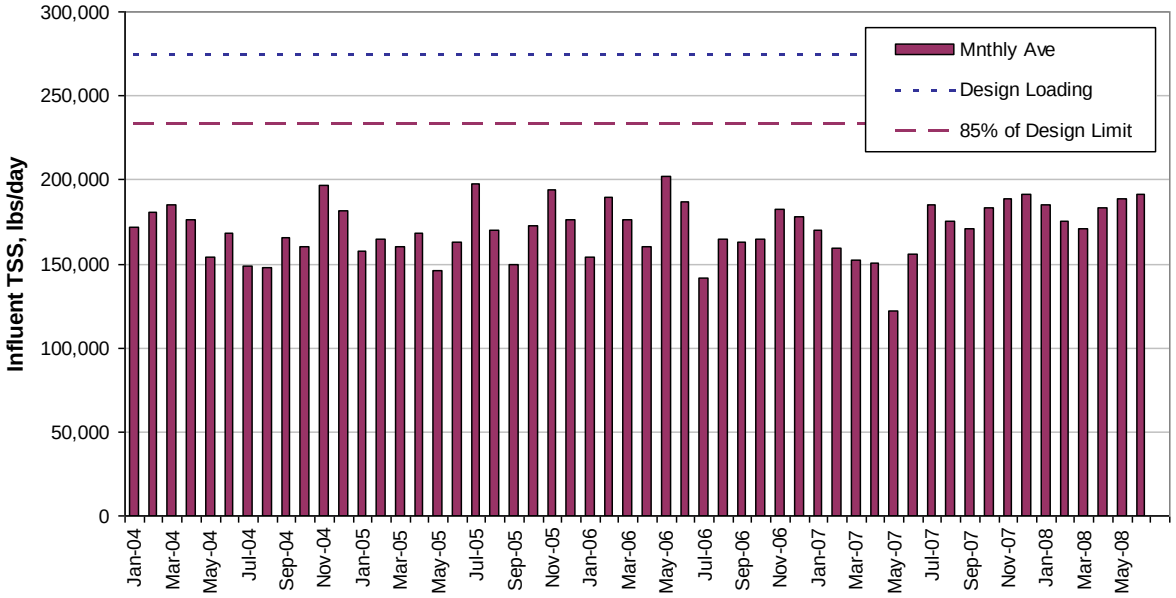
	Influent											
Date	BOD, mg/L	BOD, mg/L	BOD, ppd	BOD, ppd	CBOD, mg/L	CBOD, mg/L	CBOD, ppd	CBOD, ppd	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd
	Mnthly Ave	Max day	Mnthly Ave	Max day	Mnthly Ave	Max day	Mnthly Ave	Max Day	Mnthly Ave	Max Day	Mnthly Ave	Max day
1-Jan-04	226	287	157000	228000	188	253	131000	212000	247	355	172000	245000
1-Feb-04	192	276	152000	306000	162	319	128000	227000	228	356	181000	252000
1-Mar-04	201	267	160000	255000	163	212	131000	200000	231	324	185000	330000
1-Apr-04	191	268	79200	262000	163	250	123000	234000	230	332	176000	408000
1-May-04	180	242	128000	196000	154	257	109000	179000	208	349	154000	367000
1-Jun-04	157	257	141000	239000	136	236	121000	189000	179	263	168000	406000
1-Jul-04	154	287	130000	218000	131	228	110000	162000	172	278	149000	287000
1-Aug-04	196	374	132000	261000	163	356	110000	248000	215	413	148000	288000
1-Sep-04	195	301	146000	376000	172	250	129000	310000	218	317	166000	407000
1-Oct-04	149	212	131000	182000	143	204	124000	168000	183	242	160000	221000
1-Nov-04	178	264	157000	295000	155	216	13500	236000	217	381	197000	493000
1-Dec-04	194	273	148000	288000	171	299	13100	316000	237	326	182000	365000
1-Jan-05	213	277	77000	222000	187	260	124000	216000	239	399	158000	276000
1-Feb-05	216	400	134000	247000	183	244	114000	180000	266	410	165000	303000
1-Mar-05	219	314	140000	262000	190	272	121000	208000	249	326	160000	272000
1-Apr-05	213	292	149000	229000	175	239	123000	193000	234	340	168000	277000
1-May-05	155	242	122000	175000	131	241	104000	155000	178	268	146000	240000
1-Jun-05	143	285	127000	244000	132	387	116000	233000	172	294	163000	319000
1-Jul-05	92	165	139000	270000	78	157	116000	234000	123	263	198000	389000
1-Aug-05	135	221	130000	226000	121	178	117000	162000	169	286	170000	266000
1-Sep-05	166	243	129000	222000	140	202	109000	185000	193	269	150000	246000
1-Oct-05	192	254	159000	232000	158	204	131000	193000	208	280	173000	304000
1-Nov-05	208	325	165000	247000	182	251	145000	221000	242	364	194000	321000
1-Dec-05		262	153000	238000	176	234	135000	194000	227	292	176000	281000
1-Jan-06	199	285	134000	188000	176	225	119000	163000	227	286	154000	206000
1-Feb-06	229	292	161000	223000	202	314	142000	240000	271	412	190000	315000
1-Mar-06	222	386	162000	269000	191	262	138000	246000	241	328	176000	284000
1-Apr-06	229	374	159000	257000	198	306	137000	204000	228	417	160000	350000
1-May-06	105	222	154000	328000	89	197	131000	261000	132	246	202000	458000
1-Jun-06	127	248	157000	307000	107	234	132000	268000	148	298	187000	436000
1-Jul-06	130	247	127800	255900	106	184	105100	220100	138	262	141800	322500
1-Aug-06	183	547	148522	481200	162	597	130200	525000	201	636	165000	599700
1-Sep-06	165	228	150700	278100	134	186	122000	157500	177	219	162500	247300
1-Oct-06	203	293	148100	205100	177	277	129100	201400	224	353	164800	313800
1-Nov-06	222	439	158000	318700	175	237	124300	198900	249	486	182100	361400
1-Dec-06		401		264300	213	316	145100	208200	260	366	177700	241400
1-Jan-07	224	327	13700	42300	190	308	127000	22500	252	342	170000	259700
1-Feb-07	229	322	145500	232700	198	291	125200	192600	252	411	159300	251100
1-Mar-07	215	326	147200	237400	183	288	126500	234600	217	363	152000	265400
1-Apr-07	198	385	142000	257600	174	313	124600	219900	206	351	150100	286200
1-May-07	171	278	124700	188400	153	241	111600	182300	162	305	121600	242700
1-Jun-07	116	259	120000	240200	103	223	109700	207000	133	271	155600	371000
1-Jul-07	155	287	153700	346700	133	234	130800	273300	182	335	185300	452600
1-Aug-07	202	415	142600	254300	188	507	133000	310600	244	525	175100	321400
1-Sep-07	175	348	137300	216800	149	305	116700	185100	215	410	171000	267100
1-Oct-07	200	284	149800	217800	169	262	126700	237800	241	662	183400	507800
1-Nov-07	218	259	164000	225900	193	297	144600	205200	251	339	188400	272900
1-Dec-07	227	335	170100	221800	198	290	147200	191700	253	313	191600	248100
1-Jan-08	155	287	153700	346700	133	234	130800	273300	182	335	185300	452600
1-Feb-08	202	415	142600	254300	188	507	133000	310600	244	525	175100	321400
1-Mar-08	175	348	137300	216800	149	305	116700	185100	215	410	171000	267100
1-Apr-08	200	284	149800	217800	169	262	126700	237800	241	662	183400	507800
1-May-08	218	259	164000	225900	193	297	144600	205200	251	339	188400	272900
1-Jun-08	227	335	170100	221800	198	290	147200	191700	253	313	191600	248100
AVE:	186	302	141008	249269	162	273	121759	218785	214	356	170743	324333
MIN:	92	165	13700	42300	78	157	13100	22500	123	219	121600	206000
MAX:	229	547	170100	481200	213	597	147200	525000	271	662	202000	599700
Limit			254000								274000	
85%			215900								232900	

Effluent

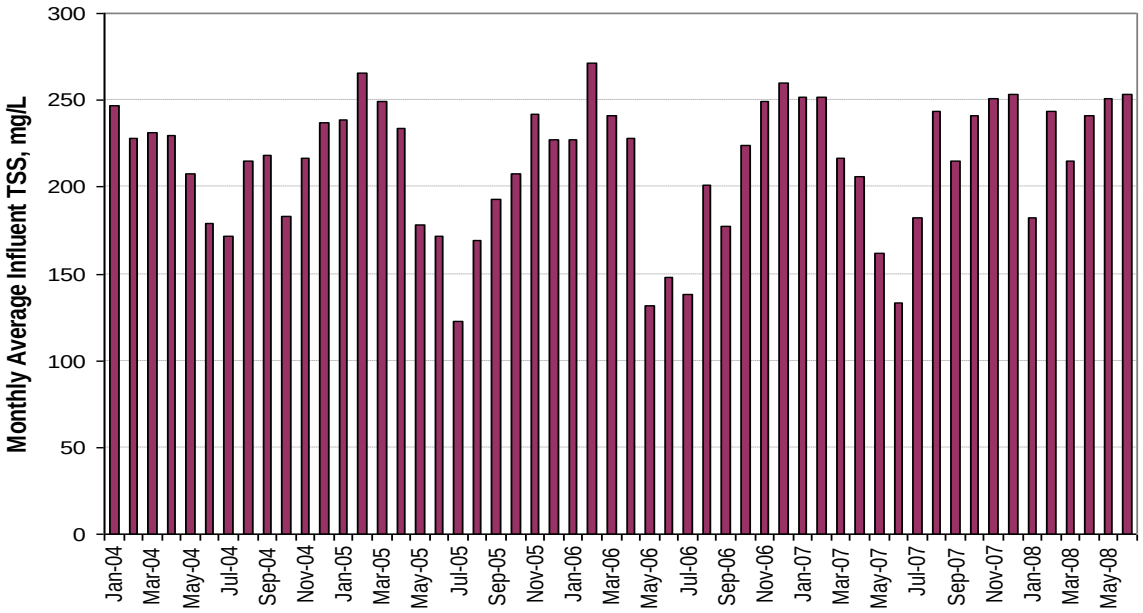
Flow, MGD	Flow, MGD	CBOD, mg/L	CBOD, mg/L	CBOD, ppd	CBOD, ppd	CBOD, % Removal	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd	TSS, % Removal	PH	PH	Coliform, #/100 ml	Coliform, #/100 ml	Cl, ug/L	Cl, ug/L	Cal. Cl, ppd	Cl, ppd
Mnthly Ave	Max day	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Mnthly Ave	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Mnthly Ave	Day Min	Day Max	GEM	GM7	Ave Monthly	Max day	Monthly Ave	Max
144.9	357.7	8	9	11000	16000	93	10	12	15000	22000	94	6	8.2	4	8	61	167	61	167
112.6	188.8	6	7	5000	8000	95	8	11	8000	13000	95	6.2	7.7	2	8	49	82	49	82
96.16	189.5	9	11	8000	11000	94	12	16	10000	16000	95	6.4	7.3	2	3	71	143	71	143
76.07	90.22	6	7	4000	5000	96	9	7	6000	6000	96	6.7	7.7	3	6	95	406	95	406
84.3	194.2	7	7	5000	8000	96	10	12	8000	12000	95	6.3	7.3	3	6	70	157	70	157
92.11	120.9	9	10	7000	8000	95	13	15	10000	13000	95	6.6	7.2	53	89	60	158	60	158
83.56	100.7	8	11	5000	8000	96	11	18	8000	13000	95	6.5	7.3	16	53	55	127	55	127
100.8	238.1	6	7	6000	8000	96	13	20	13000	20000	94	6.5	7.2	33	62	67	115	67	115
96.26	143.3	7	8	6000	7000	95	10	13	9000	12000	96	6.7	7.2	27	142	46	121	46	121
93.17	189.7	8	9	7000	8000	95	9	11	8000	10000	96	6.6	7	5	26	50	100	50	100
88.88	232.6	8	12	6000	8000	95	13	17	11000	15000	94	6.5	7.3	3	8	40	93	40	93
125.4	351.5	9	13	10000	21000	94	18	34	26000	65000	90	6.5	7.2	4	16	45	89	45	89
111.1	327.2	8	11	8000	15000	94	10	13	12000	26000	94	6.6	7.2	3	3	39	66	39	66
83.47	191.7	10	11	7000	7000	94	13	16	9000	10000	94	6.5	7.2	2	15	39	67	39	67
96.41	312.8	9	11	7000	10000	95	10	13	9000	16000	96	6.5	7.5	2	4	45	78	45	78
108.7	212.6	5	7	5000	6000	96	7	10	7000	8000	96	6.5	6.9	3	18	41	68	41	68
107.7	187.2	7	9	7000	11000	95	13	18	13000	21000	94	6.6	7.4	17	46	56	114	56	114
90.75	136.5	7	8	5000	6000	96	11	12	8000	10000	95	6.7	7.4	17	31	56	93	56	93
78.84	112	7	9	5000	7000	95	10	33	7000	9000	95	6.4	7.4	7	48	75	110	75	110
74.1	88.61	8	9	5000	6000	95	12	13	8000	8000	93	6.7	8.5	8	13	83	130	83	130
76.82	109.2	7	8	5000	6000	95	11	12	7000	9000	94	6.4	7.3	6	16	67	117	67	117
86.31	147.1	7	8	5000	11000	96	10	12	8000	9000	96	6.5	7.2	12	51	42	95	42	95
108.3	240.1	7	11	8000	15000	95	12	24	15000	37000	93	6.3	7.1	3	13	53	112	53	112
137.8	276	5	9	8000	16000	96	11	21	18000	39000	94	6.1	7	2	3	49	134	49	134
204.6	335.2	7	8	1200	17000	91	13	20	27000	47000	89	6.3	6.9	2	4	59	123	59	123
130.5	250.7	6	10	7000	22000	95	10	18	12000	42000	94	6.4	7	3	4	68	108	68	108
94	173	4	6	3000	7000	97	7	11	6000	12000	96	6.3	7	2	4	82	43	82	43
100	173	6	9	5000	9000	96	7	10	6000	10000	97	6.5	7	2	4	106	54	106	54
97	139	6	8	5000	7000	97	10	12	8000	11000	96	6.5	7.1	5	90	70	108	70	108
94.32	152.3	6	6	5000	5000	97	9	9	7000	7000	96	6.3	7.6	35	181	64	151	64	151
80.71	94.78	8	8	5000	6000	96	11	12	8000	8000	95	6.5	7.1	14	24	68	129	68	129
84.05	91.57	9	11	6000	8000	96	13	18	9000	12000	95	6.8	7.4	9	51	91	202	91	202
87.87	127.6	6	6	4000	4000	97	8	9	6000	7000	97	6.8	7.7	3	10	64	108	64	108
84.14	134.5	7	8	5000	6000	97	9	11	7000	8000	96	6.5	7.5	4	6	70	100	70	100
188.2	302.1	6	9	11200	14000	93	12	16	22000	30000	91	6.1	7.2	4	7	93	161	93	161
164.9	324.2	8	10	13000	20000	92	12	16	19000	34000	92	6.2	7.6	3	6	88	177	88	177
134.2	275.9	10	17	11100	13500	90	13	26	14200	20200	91	6.7	7.4	5	11	79	122	79	122
96.8	160.9	13	21	10500	16000	92	19	34	15200	26300	91	6.6	7.3	6	35	81	122	81	122
112.2	193.8	5	6	4700	5400	96	7	8	6600	7100	96	6.4	7.3	2	4	112	231	112	231
88.31	133.8	7	7	4900	5800	96	9	10	6500	7800	96	6.4	7.1	3	3	107	169	107	169
87.58	174	7	10	5800	9300	96	10	17	8400	14000	96	6.1	7.2	2	3	76	182	76	182
82.34	106.1	8	9	5600	6100	96	11	12	7700	8300	96	6.7	7.1	2	4	111	147	111	147
81.6	122.6	9	11	6300	8400	95	12	15	8400	11200	95	6.9	7.5	8	27	108	152	108	152
76.7	127.1	7	9	4300	5400	97	8	11	5300	6700	97	6.8	7.6	8	17	113	227	113	227
86.18	219.7	6	7	4600	4700	97	8	9	6500	6000	96	6.6	7.4	2	3	138	195	138	195
90.09	207	7	9	5100	7000	96	9	13	7100	12800	96	6.6	7.3	3	13	117	164	117	164
93.11	220.4	7	8	5800	9600	95	10	13	8200	15800	94	6.6	7.5	3	31	110	176	110	176
146.9	400.7	8	11	1200	27400	92	13	26	24700	73700	90	6.2	7.2	1	2	105	149	105	149
122	188.7	6	7	6800	8700	95	9	12	10100	15900	95	6.6	7.2	4	38	107	155	107	155
87.07	155.1	5	6	3600	4800	97	6	7	4800	7000	97	6.7	7.2	2	6	121	174	121	174
99.77	202.4	6	7	5000	7500	96	8	9	7000	11000	96	6.5	7.1	3	6	124	155	124	155
90.18	135.2	6	7	4500	5600	96	8	9	6000	6900	97	6.5	7.3	3	8	114	158	114	158
90.1	113.6	6	7	4500	5600	97	8	9	6400	6900	97	6.4	7.7	3	4	129	164	129	164
94.14	252.3	6	8	5800	12500	97	11	17	11200	27400	96	6.5	7.5	2	4	123	185	123	185
102.30	193.06	7	9	6028	9635	95	10	15	10265	17259	95	6.5	7.3	7	24	62	120	62	120
74.10	88.61	4	6	1200	4000	90	6	7	4800	6000	89	6.0	6.9	1	2	39	43	39	43
204.61	400.72	13	21	13000	27400	97	19	34	27000	73700	97	6.9	8.5	53	181	106	406	106	406
215.00		25	40	44800	71700	85	30	45	53800	80700	85	6.0	9.0	200	400	160	420	285	
182.75									45730	68595									

APPENDIX E—DISCHARGE MONITORING REPORT GRAPHS

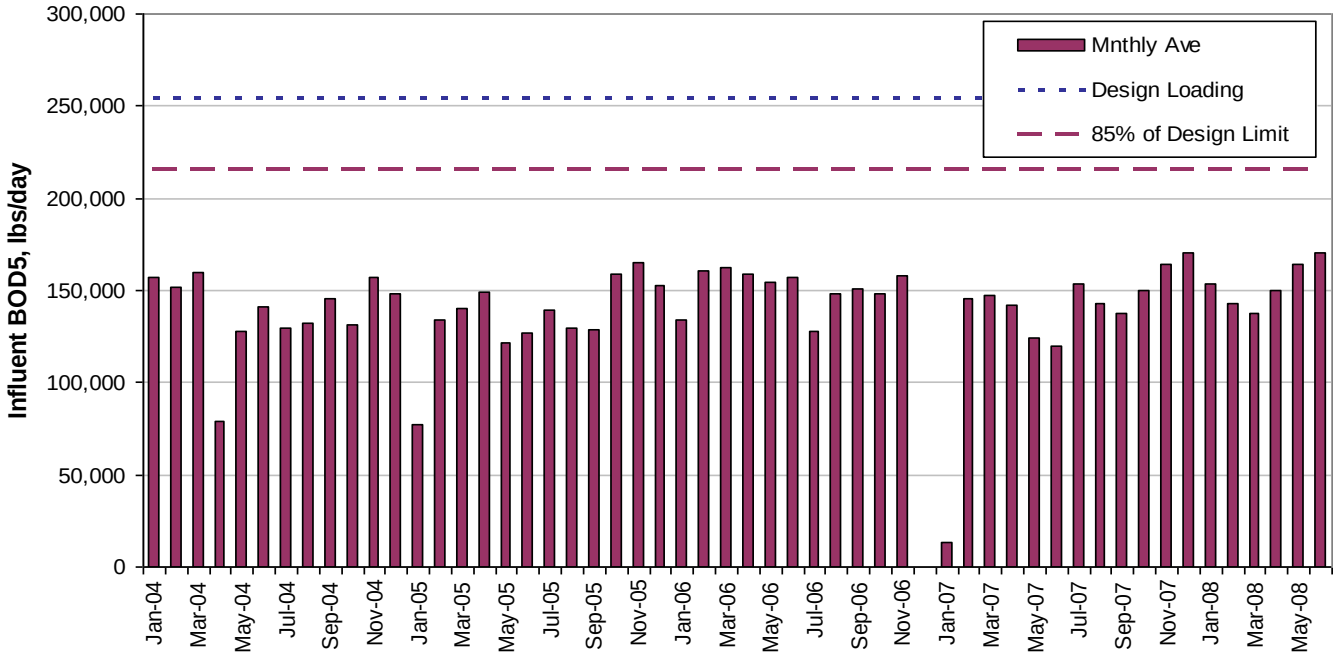
West Point WWTP - Influent TSS (Mass Basis)



West Point WWTP - Influent TSS (Concentration Basis)

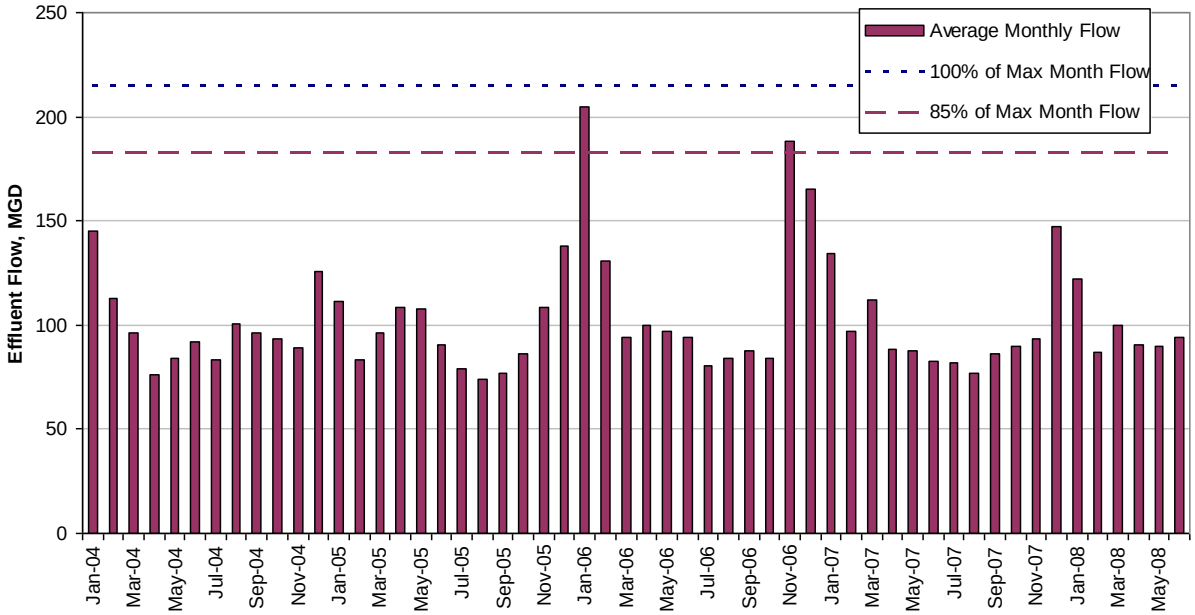


West Point WWTP - Influent BOD5 (Mass Basis)

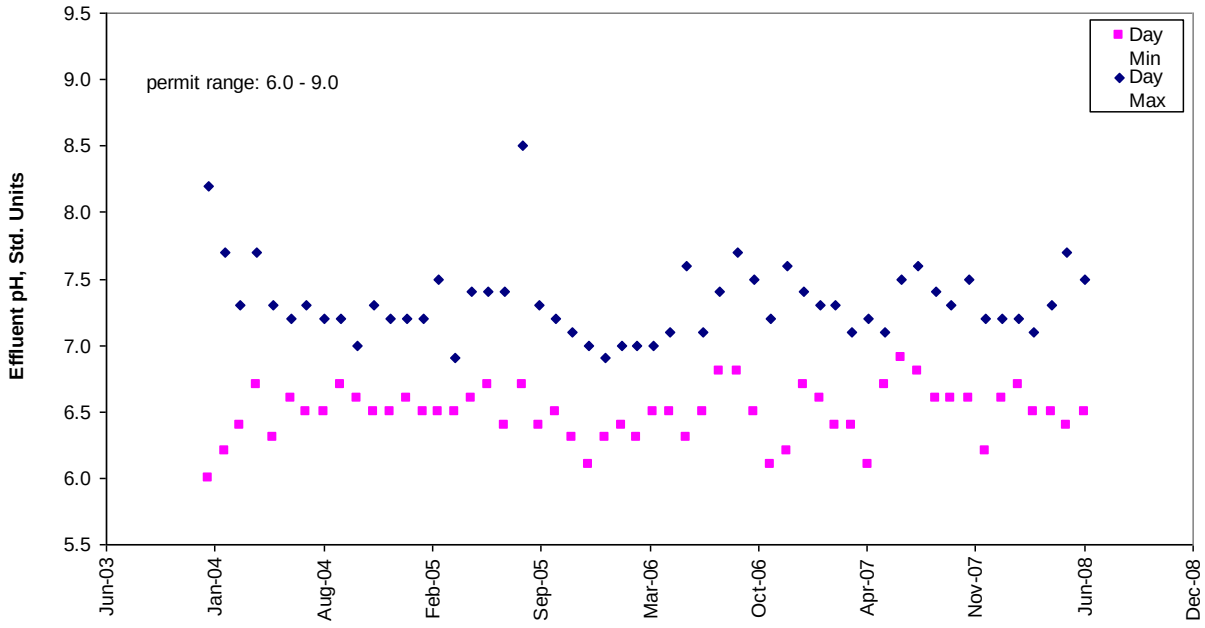


West Point WWTP - Influent BOD5 (Concentration Basis)

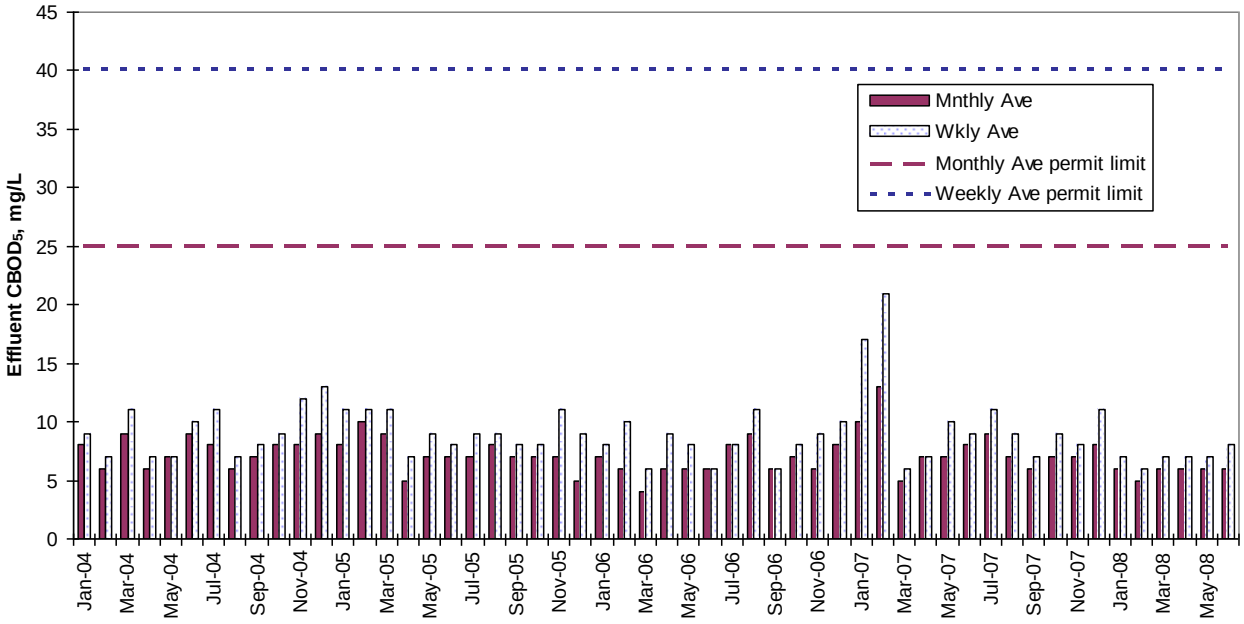
West Point WWTP – Effluent Flow



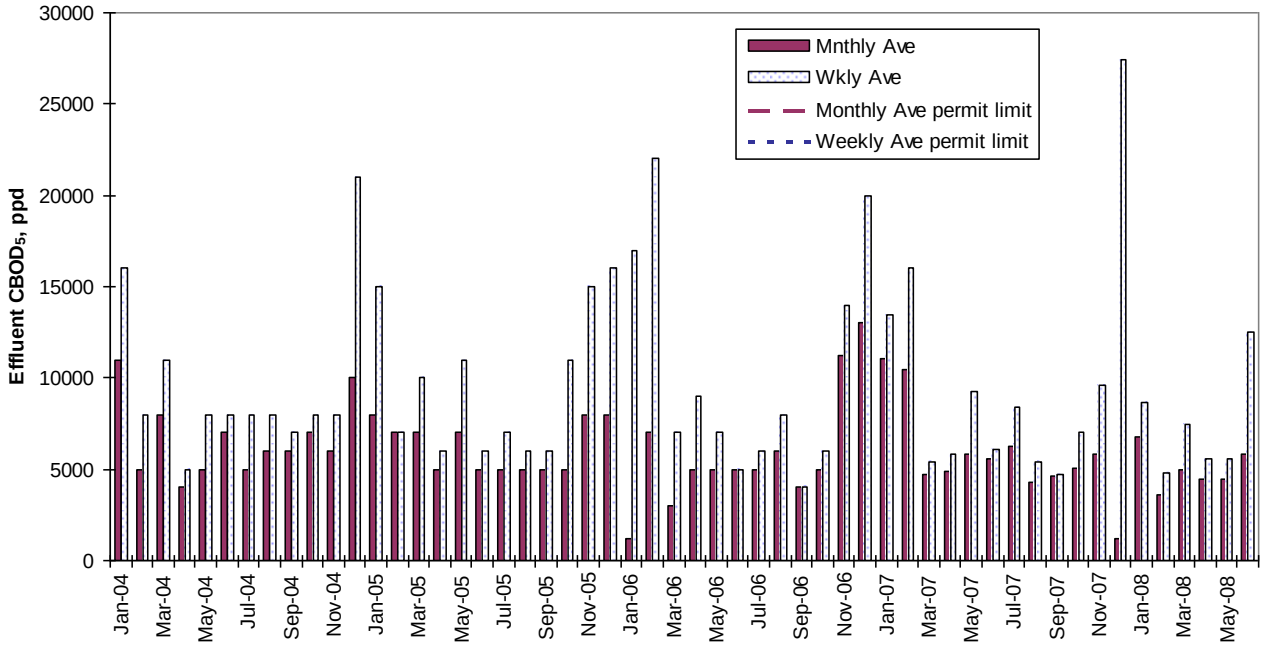
West Point WWTP – Effluent pH



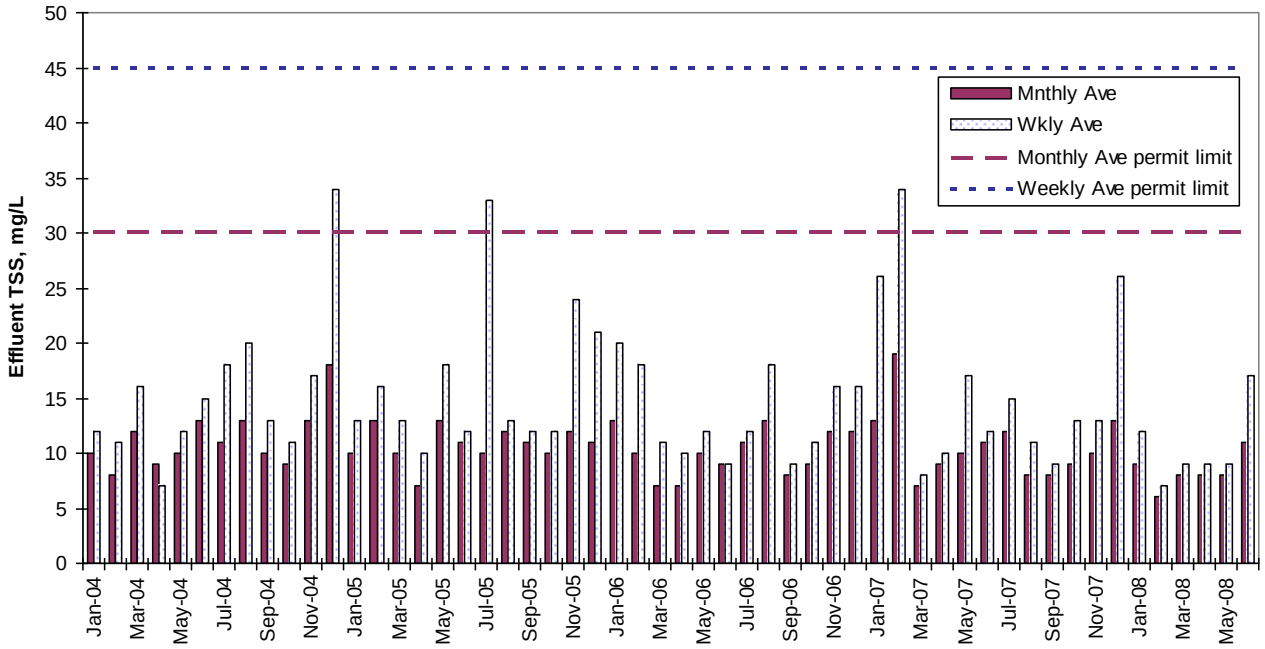
West Point WWTP – Effluent CBOD5 (Concentration basis)



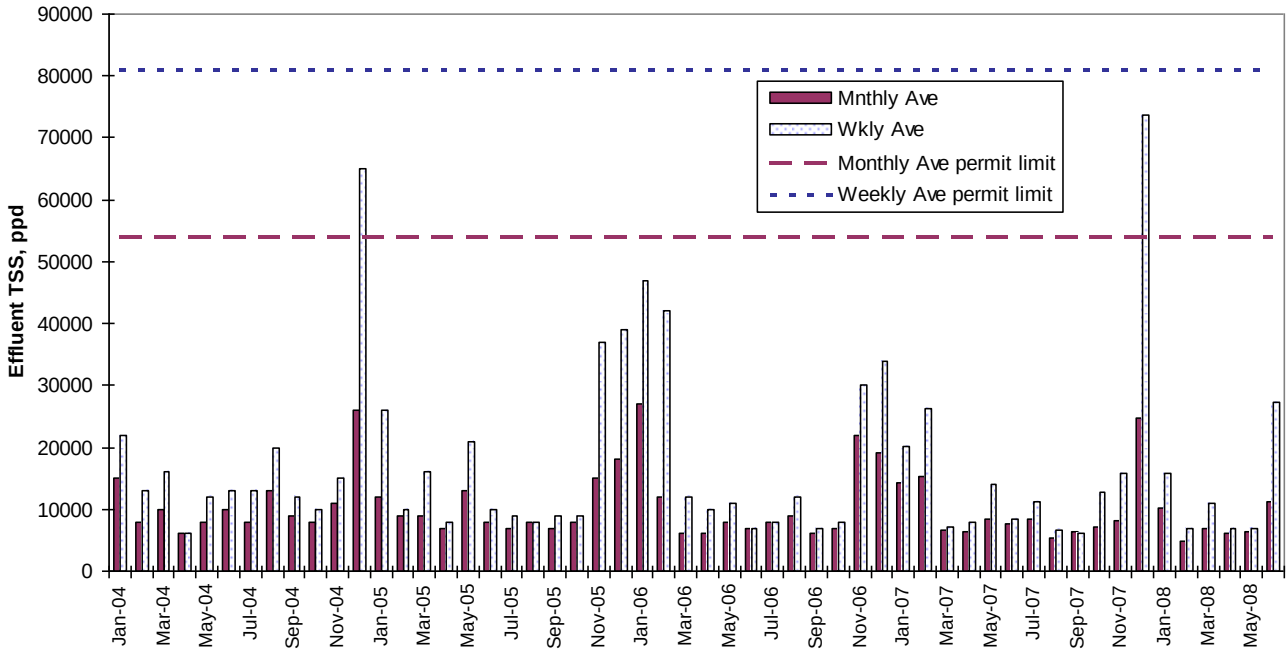
West Point WWTP – Effluent CBOD5 (Mass basis)



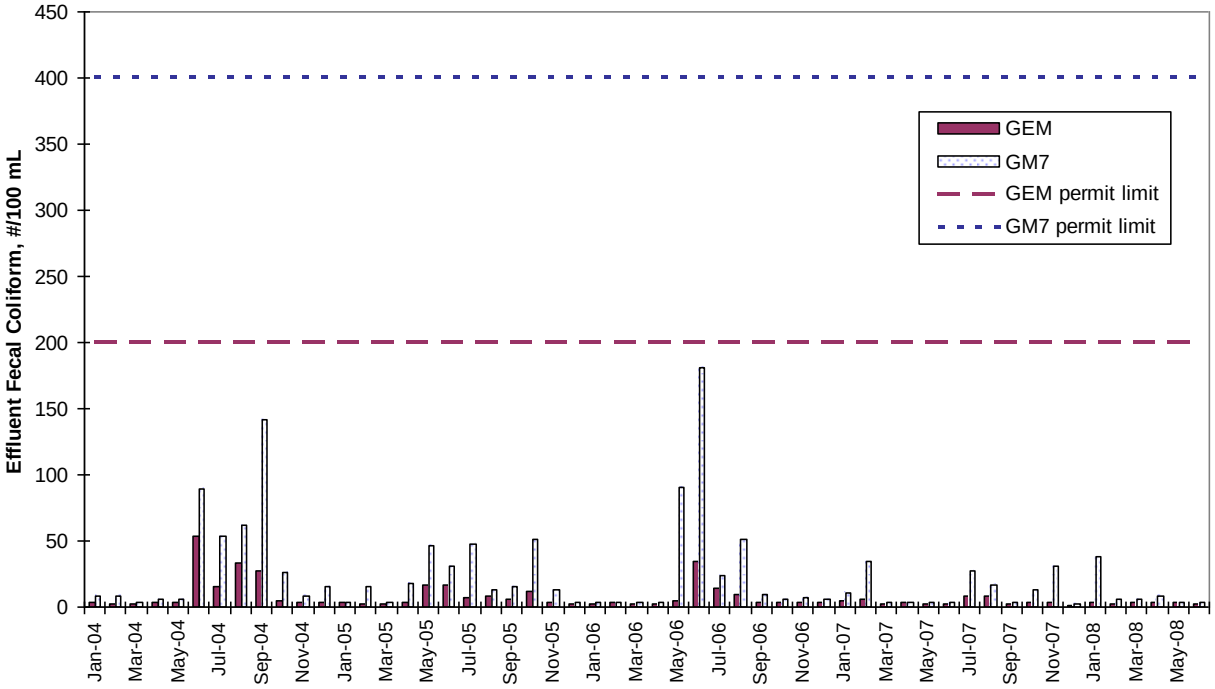
West Point WWTP – Effluent TSS (Concentration basis)



West Point WWTP – Effluent TSS (Mass basis)



West Point WWTP – Effluent Fecal Coliform



APPENDIX F—TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on Ecology's homepage at http://www.ecy.wa.gov/programs/eap/pwspread/pwspread.html.

Table F-1: West Point WWTP – Water Quality Criteria for Detected Pollutants

FACILITY: West Point WWTP
FILENAME:
RUN DATE: 9/2/2008
PREPARED BY: M. Henley

Red font = National Toxics Rule (40 CFR 131.36)
Blue font = EPA National Recommended Water Quality Criteria:2002 (EPA 822-R-02-47)
Green font = Other source - see comment
Black font = WAC 173-201A (Nov. 1997)

Input Required Data **Units**

ENTER RECEIVING WATER TSS (IF UNKNOWN LEAVE IF RECEIVING WATER TSS IS ANNUAL DATA INSERT A, OR S IF FROM CRITICAL PERIOD INSERT S> 0

HARDNESS VALUE USED FOR HARDNESS DEPENDENT LIMITS>>>> 50 mg/L at $CaCO_3$

* = INSUFFIFIENT DATA TO DEVELOP CRITERIA

VALUE PRESENTED IS TH L.O.E.L- LOWEST OBSERVED

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

Pollutant Detected input "y"	Pollutant	CAS No.	NPDES Application Reference No.	Hardness or pH dependent	Conversion Factor	Conversion Factor Chronic	Priority Pollutants	Carcinogen	Water Quality Criteria - Marine - Acute	Water Quality Criteria - Marine - Chronic	Human Health Criteria - Marine	Organoleptic Effects	Metals Translators Marine - Acute	Metals Translators Marine - Chronic
30100.00	AMMONIA unionized <see seperate spreadsheets for FW criteria						N	N	233	35				
0.95	ANTIMONY (INORGANIC)	7440360	1M				Y	N			4300			
2.00	ARSENIC (dissolved)	7440382	2M				Y	Y	69	36			1.00	
3.03	BIS(2-ETHYLHEXYL) PHTHALATE	117817	13B				Y	Y			5.9			
0.10	CADMIUM	7440439	4M	50.0	0.97	0.94	Y	N	42.00	9.3			0.994	0.994
406.00	CHLORINE (Total Residual)	7782506					N	N	13	7.50				
8.21	CHLOROFORM	67663	11V				Y	Y			470			
1.00	CHROMIUM(HEX)	18540300					Y	N	1100	50			0.993	0.993
17.00	COPPER	744058	6M	50.0			Y	N	4.80	3.10		1000.00	0.83	0.83
10.10	1,4 DICHLOROBENZENE	106467	22B				Y	N			2600			
1.60	DIETHYLPHTHALATE	84662	24B				Y	N			120000			
1.00	LEAD	7439921	7M	50.0	0.89		Y	N	210.00	8.10			0.951	0.95
9.10	METHYLENE CHLORIDE	75092	22V				Y	Y			1600			
0.01	MERCURY	7439976	8M				Y	N	1.80	0.0250	0.15		0.85	
4.00	NICKEL	7440020	9M	50.0			Y	N	74.00	8.20	4600		0.99	0.99
0.91	SILVER	7740224	11M	50.0			Y	N	1.90	NA			0.85	
1.40	TETRACHLOROETHYLENE	127184	24V				Y	Y			8.85			
44.00	ZINC	7440666	13M	50.0			Y	N	90.00	81.00		5000.00	0.946	0.946

Updated the formulas and values to match with WAC 173-201A in December of 1992. Enter the hardness value for the receiving water for hardness dependent metals in B200 and TSS values in B199.
Spreadsheet updated with human health criteria by Gary Bailey in March 1995 and checked by G. Shervey
Metal criteria changed to those announced in FR Vol. 60 No.86 5/4/95 (10/95)
Metal translators added 6/96 (based on work by Pelletier and FR Vol 60, No.86 5/4/95)
Criteria values updated 9/03

Table F-2: West Point WWTP - Ammonia Calculation Spreadsheet

Ammonia Calculation Spreadsheet

Calculation of seawater fraction of un-ionized ammonia
from Hampson (1977). Un-ionized ammonia criteria for
salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

Facility: West Point WWTP
Permit No: WA-0022262-4(M)

INPUT*			
1. Temperature, deg C (90th percentile):	13.1		
2. pH, (90th percentile):	8.2		
3. Salinity, g/Kg (90th percentile):	30.4		
OUTPUT			
1. Pressure (atm; EPA criteria assumes 1 atm):	1.0		
2. Molal Ionic Strength (not valid if >0.85):	0.625		
3. pKa8 at 25 deg C (Whitfield model "B"):	9.317		
4. Percent of Total Ammonia Present as Unionized:	3.044%		
5. Unionized ammonia criteria (mg un-ionized NH3 per liter) from EPA 440/5-88-004			
Acute:	0.233		
Chronic:	0.035		
6. Total Ammonia Criteria (mg/L as NH3)			
Acute:	7.66		
Chronic:	1.15		
7. Total Ammonia Criteria (mg/L as NH3-N)			
Acute:	6.29	6292.78	ug/L
Chronic:	0.95	945.27	ug/L

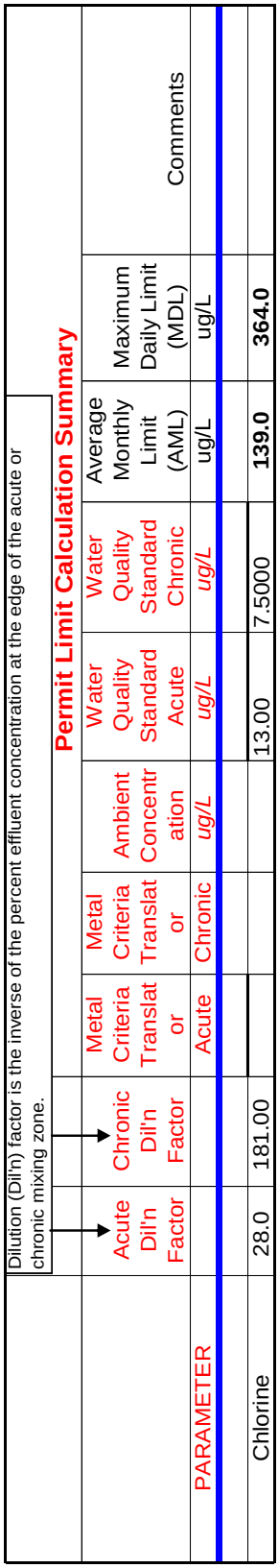
* Data from ambient monitoring station PSB003, west point outfall

fn: TSDCalc10.cls

Table F-3: West Point WWTP - Reasonable Potential to Exceed the Water Quality Standards

Parameter	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	State Water Quality Standard		Max concentration at edge of...		LIMIT REQ'D?	Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
	Acute	Chronic		Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone			Pn		CV	s	n			
			ug/L	ug/L	ug/L	ug/L	ug/L				ug/L						
Ammonia				6293	945	0.82	0.13	NO	0.95	0.984	30.10	0.60	0.55	185	0.76	28	181
ARSENIC (dissolved)	1.00		69	36		0.11	0.02	NO	0.95	0.819	2.00	0.60	0.55	15	1.50	28	181
CADMIUM	0.994	0.994	42.00	9.3		0.01	0.00	NO	0.95	0.838	0.10	0.60	0.55	17	1.44	28	181
CHLORINE (Total Residual)			13	7.50		7.35	1.14	NO	0.95	0.998	406.00	0.60	0.55	1461	0.51	28	181
CHROMIUM(HEX)	0.993	0.993	1100	50		0.05	0.01	NO	0.95	0.838	1.00	0.60	0.55	17	1.44	28	181
COPPER	0.83	0.83	4.80	3.10		0.73	0.11	NO	0.95	0.838	17.00	0.60	0.55	17	1.44	28	181
LEAD	0.951	0.95	210.00	8.10		0.05	0.01	NO	0.95	0.838	1.00	0.60	0.55	17	1.44	28	181
MERCURY	0.85		1.80	0.0250		0.00	0.00	NO	0.95	0.838	0.01	0.60	0.55	17	1.44	28	181
NICKEL	0.99	0.99	74.00	8.20		0.20	0.03	NO	0.95	0.838	4.00	0.60	0.55	17	1.44	28	181
SILVER	0.85		1.90	NA		0.04	0.01		0.95	0.838	0.91	0.60	0.55	17	1.44	28	181
ZINC	0.946	0.946	90.00	81.00		2.10	0.32	NO	0.95	0.847	44.00	0.60	0.55	18	1.41	28	181

Table F-4: West Point WWTP - Chlorine Limit to Meet Water Quality Limit



	Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.												
						Permit Limit Calculation Summary							
PARAMETER	Acute Dil'n Factor →	Chronic Dil'n Factor →	Metal Criteria Translator	Metal Criteria Translator	Ambient Concentration	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)	Comments
			Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	ug/L	ug/L	
Chlorine	28.0	181.00				13.00	7.5000	**139.0**	**364.0**	

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Limiting LTA	Statistical variables for permit limit calculation			
WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	LTA Coeff. Var. (CV)	LTA Prob'y Basis			Coeff. Var. (CV)	AML Prob'y Basis	MDL Prob'y Basis	# of Samples per Month
ug/L	*ug/L*	*ug/L*	*ug/L*	*decimal*	*decimal*		*ug/L*	*decimal*	*decimal*	*decimal*	*n*	
				0.60	0.99			0.60	0.95	0.99	4.00	1.00
364	1357.50	116.9	716.0	0.60	0.99		116.9	0.60	0.95	0.99	30.00	1.00

Table F-5: West Point WWTP - Reasonable Potential to Exceed Human Health Criteria

Human Health Criteria		Water Quality Criteria for Protection of Human Health	Max concentration at edge of chronic mixing zone.		Expected Number of Compliance Samples per Month	AVERAGE MONTHLY EFFLUENT LIMIT	MAXIMUM DAILY EFFLUENT LIMIT	Estimated Percentile at 95% Confidence		Max effluent conc. measured	Coeff Variation		# of samples from which # in col. K was taken	Multiplier	Calculated 50th percentile Effluent Conc. (When n>10)	Dilution Factor
Parameter	Ambient Concentration (Geometric Mean)			LIMIT REQ'D?					Pn		CV	S	n			
	ug/L	ug/L	ug/L			ug/L	ug/L			ug/L						
ANTIMONY (INORGANIC)		4300	0.00	NO		NONE	NONE	0.50	0.84	0.95	0.60	0.6	17	0.58	0.60	330.0
BIS(2-ETHYLHEXYL) PHTHALATE		5.9	0.01	NO		NONE	NONE	0.50	0.72	3.03	0.60	0.6	9	0.73		330.0
CHLOROFORM		470	0.01	NO		NONE	NONE	0.50	0.74	8.21	0.60	0.6	10	0.70	3.45	330.0
1,4 DICHLOROBENZENE		2600	0.02	NO		NONE	NONE	0.50	0.72	10.10	0.60	0.6	9	0.73		330.0
DIETHYLPHTHALATE		120000	0.00	NO		NONE	NONE	0.50	0.72	1.60	0.60	0.6	9	0.73		330.0
METHYLENE CHLORIDE		1600	0.03	NO		NONE	NONE	0.50	0.74	9.10	0.60	0.6	10	0.70	9.10	330.0
MERCURY		0.15	0.00	NO		NONE	NONE	0.50	0.84	0.01	0.60	0.6	17	0.58	0.01	330.0
NICKEL		4600	0.01	NO		NONE	NONE	0.50	0.84	4.00	0.60	0.6	17	0.58	3.33	330.0
TETRACHLOROETHYLENE		8.85	0.00	NO		NONE	NONE	0.50	0.74	1.40	0.60	0.6	10	0.70	1.40	330.0

Table F-6: West Point WWTP - Ambient Monitoring Data Summary

Summary of ambient monitoring data from PSB003

station	date	time	depth (meters)	salinity (psu)	temperature (c)		density (sigma t)	chlorophyll raw (ug/l)	DO (mg/l) raw	DO (mg/l) corrected	light transmission (%)	pH
MIN				20.9		8.27	16.14	-2.2	2.3	5.9	-57.3	6.8
MAX				31.04		14.71	23.45	13.6	13.7	14.5	98.8	8.4
AVG				29.53		10.55	22.57	0.88	7.51	8.28	77.48	7.83
90%				30.41		13.08	23.09	3.2	9	9.8	92.3	8.2
95%				30.6		13.31	23.22	4.7	9.4	10.4	93.27	8.3

Table F-7: West Point WWTP - Simple Dilution Assessment for Temperature and Fecal Coliform Ambient

West Point WWTP Receiving Water Calculations

Chronic Dilution Factor	181	1	
Acute Dilution Factor	28		
Facility Design Max Month Flow	215.00	mgd	
	332.68	cfs	

Fecal Coliform Dilution Calculation

Receiving Water Fecal Coliform	1	#/100 ml	Ambient Monitoring PSB003
Effluent Fecal Coliform - worst case	400	#/100 ml	
Downstream Fecal Coliform	**3**	#/100 ml	
Difference between mixed and ambient	**2**	#/100 ml	
Primary Contact and Shellfish Habitat Surface Water Criteria	*14*	*#/100 ml*	*Current state WAC designation*

Conclusion: At design flow, the discharge has no reasonable potential for violation of water quality standards for fecal coliform.

Temperature Dilution Calculation

Receiving Water Temperature	14.70	ºC	Ambient Monitoring PSB003
Effluent Temperature - worst case	23.3	ºC	As reported in application
Downstream Temperature	**14.75**	ºC	
Difference between mixed and ambient	**0.05**	ºC	
Surface Water Criteria - Extraordinary Quality Aquatic Life Use	*13.0*	ºC	*Current state WAC designation*

Conclusion: At design flow, the discharge has no reasonable potential for violation of water quality standards for temperature (<0.3ºC).

Table F-8: West Point WWTP – Assessment for Impacts to Dissolved Oxygen

Dissolved oxygen concentration following initial dilution.
References: EPA/600/6-85/002b and EPA/430/9-82-011

INPUT		Source
1. Dilution Factor at Mixing Zone Boundary:	181	Chronic dilution factor
2. Ambient Dissolved Oxygen Concentration (mg/L):	5.9	Min. at PSB003
3. Effluent Dissolved Oxygen Concentration (mg/L):	7	NPDES permit application - Not Reported. Used assumed value
4. Effluent Immediate Dissolved Oxygen Demand (mg/L):	30	DMR Data max CBOD 5-day = 21mg/L
OUTPUT		
Dissolved Oxygen at Mixing Zone Boundary (mg/L):	5.74	
Decrease of 0.2 mg/L = No Measurable Change	0.16	

Table F-9: West Point WWTP – Dilution Assessment for pH

Calculation of pH of a mixture in seawater.
Based on the CO2SYS program (Lewis and Wallace, 1998)
http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT		
1. MIXING ZONE BOUNDARY CHARACTERISTICS		
Dilution factor at mixing zone boundary	181.000	
Depth at plume trapping level (m)	2.000	not available, left as defa
2. BACKGROUND RECEIVING WATER CHARACTERISTICS		
Temperature (deg C):	14.70	PSB003, max
pH:	8.40	PSB003 max
Salinity (psu):	29.52	PSB003, avg
Total alkalinity (meq/L)	2.30	not available, left as defa
3. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	23.30	permit application
pH:	8.50	permit application
Salinity (psu)	0.00	not available, assumed v
Total alkalinity (meq/L):	2.00	not available, left as defa
4. CLICK THE 'calculate" BUTTON TO UPDATE OUTPUT RESULTS >>>	calculate	

OUTPUT	
CONDITIONS AT THE MIXING ZONE BOUNDARY	
Temperature (deg C):	14.75
Salinity (psu)	29.36
Density (kg/m^3)	1021.69
Alkalinity (mmol/kg-SW):	2.25
Total Inorganic Carbon (mmol/kg-SW):	1.87
pH at Mixing Zone Boundary:	8.40

Table F-10: Alki CSO Treatment Plant – Water Quality Criteria for Detected Pollutants

FACILITY: Alki CSO Treatment Plant
FILENAME:
RUN DATE: 9/3/2008
PREPARED BY: M. Henley

Red font = National Toxics Rule (40 CFR 131.36)
Blue font = EPA National Recommended Water Quality Criteria:2002 (EPA 822-R-02-47)
Green font = Other source - see comment
Black font = WAC 173-201A (Nov. 1997)

Input Required Data		Units
ENTER RECEIVING WATER TSS (IF UNKNOWN LEAVE	0	mg/L
IF RECEIVING WATER TSS IS ANNUAL DATA INSERT A, OR	S	
IF FROM CRITICAL PERIOD INSERT S>		
HARDNESS VALUE USED FOR HARDNESS DEPENDENT LIMITS>>>	50	mg/L at $CaCO_3$

* = INSUFFIFIENT DATA TO DEVELOP CRITERIA

VALUE PRESENTED IS TH L.O.E.L- LOWEST OBSERVED

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

Pollutant Detected input Y	Pollutant	CAS No.	NPDES Application Reference No.	Hardness or pH dependent	Conversion Factor	Conversion Factor Chronic	Priority Pollutants	Carcinogen	Water Quality Criteria - Marine - Acute	Water Quality Criteria - Marine - Chronic	Human Health Criteria - Marine	Organoleptic Effects	Metals Translators Marine - Acute	Metals Translators Marine - Chronic
0.98	ANTIMONY (INORGANIC)	7440360	1M				Y	N			4300			
3.31	ARSENIC (inorganic)						Y	Y			0.14			
5.77	BIS(2-ETHYLHEXYL) PHTHALATE	117817	13B				Y	Y			5.9			
41.40	CHLOROFORM	67663	11V				Y	Y			470			
4.10	DIETHYLPHTHALATE	84662	24B					N			120000			
0.43	DIMETHYLPHTHALATE	131113	25B				Y	N			2900000			
0.10	MERCURY	7439976	8M				Y	N	1.80	0.0250	0.15		0.85	
8.07	NICKEL	7440020	9M	50.0			Y	N	74.00	8.20	4600		0.99	0.99
2.67	TOLUENE	108883	25V				Y	N			200000			

Updated the formulas and values to match with WAC 173-201A in December of 1992. Enter the hardness value for the receiving water for hardness dependent metals in B200 and TSS values in B199.
Spreadsheet updated with human health criteria by Gary Bailey in March 1995 and checked by G. Shervey
Metal criteria changed to those announced in FR Vol. 60 No.86 5/4/95 (10/95)
Metal translators added 6/96 (based on work by Pelletier and FR Vol 60, No.86 5/4/95)
Criteria values updated 9/03

Table F-11: Alki CSO Treatment Plant - Ammonia Calculation Spreadsheet

Ammonia Calculation Spreadsheet

Calculation of seawater fraction of un-ionized ammonia
from Hampson (1977). Un-ionized ammonia criteria for
salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

Facility: Alki CSO
Permit No: WA-002918-1

INPUT*		
1. Temperature, deg C (90th percentile):	12.9	
2. pH, (90th percentile):	8.5	assumed
3. Salinity, g/Kg (90th percentile):	30.5	
OUTPUT		
1. Pressure (atm; EPA criteria assumes 1 atm):	1.0	
2. Molal Ionic Strength (not valid if >0.85):	0.627	
3. pKa8 at 25 deg C (Whitfield model "B"):	9.318	
4. Percent of Total Ammonia Present as Unionized:	5.809%	
5. Unionized ammonia criteria (mg un-ionized NH3 per liter) from EPA 440/5-88-004		
Acute:	0.233	
Chronic:	0.035	
6. Total Ammonia Criteria (mg/L as NH3)		
Acute:	4.01	
Chronic:	0.60	
7. Total Ammonia Criteria (mg/L as NH3-N)		
Acute:	3.30	3297.12
Chronic:	0.50	495.28

* Data from ambient monitoring station LSKQ06, off Alki outfall

Table F-12: Alki CSO Treatment Plant - Reasonable Potential to Exceed the Water Quality Standards

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

CALCULATIONS

Parameter	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	State Water Quality Standard		Max concentration at edge of...		LIMIT REQ'D?	Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
	Acute	Chronic	ug/L	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone			Pn	ug/L	CV	s	n				
ARSENIC (dissolved)	1.00		1.20000	69	36	1.62	1.32	NO	0.95	0.473	3.31	0.60	0.55	4	2.59	18	61	Reported as Total
CADMIUM	0.994	0.994	0.06900	42.00	9.3	0.09	0.08	NO	0.95	0.368	0.15	0.60	0.55	3	3.00	18	61	
CHROMIUM(HEX)	0.993	0.993	0.17000	1100	50	0.96	0.40	NO	0.95	0.473	5.45	0.60	0.55	4	2.59	18	61	Reported as Total
COPPER	0.83	0.83	0.40000	4.80	3.10	3.31	1.23	NO	0.95	0.473	23.90	0.60	0.55	4	2.59	18	61	
LEAD	0.951	0.95	0.00730	210.00	8.10	1.40	0.41	NO	0.95	0.473	9.94	0.60	0.55	4	2.59	18	61	
MERCURY	0.85		0.00032	1.80	0.0250	0.03	0.01	NO	0.95	0.050	0.10	0.60	0.55	1	6.20	18	61	
NICKEL	0.99	0.99	0.48000	74.00	8.20	1.63	0.81	NO	0.95	0.473	8.07	0.60	0.55	4	2.59	18	61	
SILVER	0.85			1.90	NA	0.06	0.02		0.95	0.224	0.31	0.60	0.55	2	3.79	18	61	
ZINC	0.946	0.946	1.10000	90.00	81.00	12.15	4.27	NO	0.95	0.473	79.50	0.60	0.55	4	2.59	18	61	
Ammonia				3297.00	495.00	10.63	3.05	NO	0.95	0.050	30.00	0.60	0.55	1	6.20	18	61	NH3 not measured in effl., assumed valu
Chlorine				13.00	7.50	271.00	77.75	YES	0.95	0.829	3228.00	0.60	0.55	16	1.47	18	61	

Table F-13: Alki CSO Treatment Plant - Chlorine Limit to Meet Water Quality Limit

	Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.					**Permit Limit Calculation Summary**					
	Acute Dil'n Factor →	Chronic Dil'n Factor →	Metal Criteria Translator	Metal Criteria Translator	Ambient Concentration	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)	Comments
PARAMETER			Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	ug/L	ug/L	
Chlorine	18.0	61.00				13.00	7.5000	**116.6**	**234.0**	

Table F-14: Alki CSO Treatment Plant - Reasonable Potential to Exceed Human Health Criteria

Revised 3/00	Ambient Concentration (Geometric Mean)	Water Quality Criteria for Protection of Human Health	Max concentration at edge of chronic mixing zone.	LIMIT REQ'D?	Expected Number of Compliance Samples per Month	AVERAGE MONTHLY EFFLUENT LIMIT	MAXIMUM DAILY EFFLUENT LIMIT	Estimated Percentile at 95% Confidence		Max effluent conc. measured	Coeff Variation		# of samples from which # in col. K was taken	Multiplier	Calculated 50th percentile Effluent Conc. (When n>10)	Dilution Factor
Parameter	*ug/L*	*ug/L*	*ug/L*			*ug/L*	*ug/L*		*Pn*	*ug/L*	*CV*	**S**	*n*			
ANTIMONY (INORGANIC)		4300	0.04	NO		NONE	NONE	0.50	0.05	0.98	0.60	0.6	1	2.49		61.0
ARSENIC (inorganic)		0.14	0.06	NO		NONE	NONE	0.50	0.47	3.31	0.60	0.6	4	1.04		61.0
BIS(2-ETHYLHEXYL) PHTHALATE		5.9	0.10	NO		NONE	NONE	0.50	0.47	5.77	0.60	0.6	4	1.04		61.0
CHLOROFORM		470	1.69	NO		NONE	NONE	0.50	0.05	41.40	0.60	0.6	1	2.49		61.0
DIETHYLPHTHALATE		120000	0.07	NO		NONE	NONE	0.50	0.47	4.10	0.60	0.6	4	1.04		61.0
DIMETHYLPHTHALATE		2900000	0.02	NO		NONE	NONE	0.50	0.05	0.43	0.60	0.6	1	2.49		61.0
MERCURY	0.0003	0.15	0.00	NO		NONE	NONE	0.50	0.05	0.10	0.60	0.6	1	2.49		61.0
NICKEL	0.4800	4600	0.61	NO		NONE	NONE	0.50	0.47	8.07	0.60	0.6	4	1.04		61.0
TOLUENE		200000	0.11	NO		NONE	NONE	0.50	0.05	2.67	0.60	0.6	1	2.49		61.0

Table F-15: Alki CSO Treatment Plant - Ambient Monitoring Data Summary

Summary of ambient monitoring data from PSB003

LSKQ06	Salinity (psu)	Temperature (deg C)	Density (sigma-t) (kg/m3)
MIN	10.427	7.6	7.61
MAX	30.874	30.3	23.56
AVG	29.5108	10.72648305	22.524047
90%	30.4587	12.9	23.29
95%	30.5558	13.2	23.4345

Table F-16: Alki CSO Treatment Plant - Simple Dilution Assessment for Temperature and Fecal Coliform Ambient

Alki WWTP Receiving Water Calculations

Chronic Dilution Factor	61	1	
Acute Dilution Factor	18		
Facility Design Max Month Flow	51.00	mgd	
	78.91	cfs	

Fecal Coliform Dilution Calculation

Receiving Water Fecal Coliform	3	#/100 ml	assumed, FC not available from LSKQ06
Effluent Fecal Coliform - worst case	400	#/100 ml	
Downstream Fecal Coliform	**9**	#/100 ml	
Difference between mixed and ambient	**6**	#/100 ml	
Primary Contact and Shellfish Habitat Surface Water Criteria	*14*	*#/100 ml*	*Current state WAC designation*

Conclusion: At design flow, the discharge has small impact on receiving water fecal coliform concentration.

Temperature Dilution Calculation

Receiving Water Temperature	13.20	ºC	Ambient Monitoring LSKQ06, 95%
Effluent Temperature - worst case	23.3	ºC	As reported in permit application for W. Pt.
Downstream Temperature	**13.36**	ºC	
Difference between mixed and ambient	**0.16**	ºC	
Surface Water Criteria - Extraordinary Quality Aquatic Life Use	*13.0*	ºC	*Current state WAC designation*

Conclusion: At design flow, the discharge has small impact on receiving temperature.

Table F-17: Alki CSO Treatment Plant – Assessment for Impacts to Dissolved Oxygen

Alki CSO Treatment Plant

Dissolved oxygen concentration following initial dilution.
References: EPA/600/6-85/002b and EPA/430/9-82-011

INPUT		Source
1. Dilution Factor at Mixing Zone Boundary:	61	Chronic dilution factor
2. Ambient Dissolved Oxygen Concentration (mg/L):	6	Assumed Min. at LSKQ06
3. Effluent Dissolved Oxygen Concentration (mg/L):	7	NPDES permit application - Not Reported. Used assumed value
4. Effluent Immediate Dissolved Oxygen Demand (mg/L):	20	NPDES permit application - Not Reported. Used assumed value
OUTPUT		
Dissolved Oxygen at Mixing Zone Boundary (mg/L):	5.69	
Decrease of 0.2 mg/L = No Measurable Change	0.31	

Table F-18: Alki CSO Treatment Plant – Dilution Assessment for pH

Calculation of pH of a mixture in seawater.
Based on the CO2SYS program (Lewis and Wallace, 1998)
http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT		
1. MIXING ZONE BOUNDARY CHARACTERISTICS		
Dilution factor at mixing zone boundary	61.000	
Depth at plume trapping level (m)	2.000	assumed
2. BACKGROUND RECEIVING WATER CHARACTERISTICS		
Temperature (deg C):	13.20	LKSQ06, 95%
pH:	8.00	not available, assumed value
Salinity (psu):	29.50	LKSQ06, avg
Total alkalinity (meq/L)	2.30	not available, left as default
3. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	20.50	WP winter max day temp
pH:	8.00	not available, assumed value
Salinity (psu)	0.00	not available, assumed value
Total alkalinity (meq/L):	2.00	not available, left as default
4. CLICK THE 'calculate" BUTTON TO UPDATE OUTPUT RESULTS >>>	calculate	
OUTPUT		
CONDITIONS AT THE MIXING ZONE BOUNDARY		
Temperature (deg C):	13.32	
Salinity (psu)	29.02	
Density (kg/m^3)	1021.71	
Alkalinity (mmol/kg-SW):	2.25	
Total Inorganic Carbon (mmol/kg-SW):	2.09	
pH at Mixing Zone Boundary:	8.00	

Table F-19: Carkeek CSO Treatment Plant – Water Quality Criteria for Detected Pollutants

FACILITY: Carkeek CSO
FILENAME:
RUN DATE: 9/3/2008
PREPARED BY: Henley

Red font = National Toxics Rule (40 CFR 131.36)
Blue font = EPA National Recommended Water Quality Criteria:2002 (EPA 822-R-02-47)
Green font = Other source - see comment
Black font = WAC 173-201A (Nov. 1997)

Input Required Data **Units**

ENTER RECEIVING WATER TSS (IF UNKNOWN LEAVE	0	mg/L
IF RECEIVING WATER TSS IS ANNUAL DATA INSERT A, OR	S	
IF FROM CRITICAL PERIOD INSERT S>		
HARDNESS VALUE USED FOR HARDNESS DEPENDENT LIMITS>>>	50	mg/L at $CaCO_3$

* = INSUFFIFIENT DATA TO DEVELOP CRITERIA

VALUE PRESENTED IS TH L.O.E.L- LOWEST OBSERVED

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

Pollutant Detected input "y"	Pollutant	CAS No.	NPDES Application Reference No.	Hardness or pH dependent	Conversion Factor	Conversion Factor Chronic	Priority Pollutants	Carcinogen	Water Quality Criteria - Marine - Acute	Water Quality Criteria - Marine - Chronic	Organoleptic Effects	Metals Translators Marine - Acute	Metals Translators Marine - Chronic
0.85	ANTIMONY (INORGANIC)	7440360	1M				Y	N					
3.25	ARSENIC (dissolved)	7440382	2M				Y	Y	69	36		1.00	
5.71	BIS(2-ETHYLHEXYL) PHTHALATE	117817	13B				Y	Y					
0.17	CADMIUM	7440439	4M	50.0	0.97	0.94	Y	N	42.00	9.3		0.994	0.994
8.38	CHLOROFORM	67663	11V				Y	Y					
3.04	CHROMIUM(HEX)	18540300					Y	N	1100	50		0.993	0.993
21.60	COPPER	744058	6M	50.0			Y	N	4.80	3.10	1000.00	0.83	0.83
3.92	DIETHYLPHTHALATE	84662	24B				Y	N					
8.62	LEAD	7439921	7M	50.0	0.89		Y	N	210.00	8.10		0.951	0.95
4.35	NICKEL	7440020	9M	50.0			Y	N	74.00	8.20		0.99	0.99
8.18	TOLUENE	108883	25V				Y	N					
86.70	ZINC	7440666	13M	50.0			Y	N	90.00	81.00	5000.00	0.946	0.946

Updated the formulas and values to match with WAC 173-201A in December of 1992. Enter the hardness value for the receiving water for hardness dependent metals in B200 and TSS values in B199.
Spreadsheet updated with human health criteria by Gary Bailey in March 1995 and checked by G. Shervey
Metal criteria changed to those announced in FR Vol. 60 No.86 5/4/95 (10/95)
Metal translators added 6/96 (based on work by Pelletier and FR Vol 60, No.86 5/4/95)
Criteria values updated 9/03

Table F-20: Carkeek CSO Treatment Plant - Ammonia Calculation Spreadsheet

Ammonia Calculation Spreadsheet

Calculation of seawater fraction of un-ionized ammonia
from Hampson (1977). Un-ionized ammonia criteria for
salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

Facility: Carkeek CSO
Permit No: WA-0022262-4(M)

INPUT*			
1. Temperature, deg C (90th percentile):	12.9		
2. pH, (90th percentile):	8.0	assumed	
3. Salinity, g/Kg (90th percentile):	30.5		
OUTPUT			
1. Pressure (atm; EPA criteria assumes 1 atm):	1.0		
2. Molal Ionic Strength (not valid if >0.85):	0.627		
3. pKa8 at 25 deg C (Whitfield model "B"):	9.318		
4. Percent of Total Ammonia Present as Unionized:	1.913%		
5. Unionized ammonia criteria (mg un-ionized NH3 per liter) from EPA 440/5-88-004			
Acute:	0.233		
Chronic:	0.035		
6. Total Ammonia Criteria (mg/L as NH3)			
Acute:	12.18		
Chronic:	1.83		
7. Total Ammonia Criteria (mg/L as NH3-N)			
Acute:	10.01	10012.29	ug/L
Chronic:	1.50	1503.99	ug/L

* Data from ambient monitoring station CK200P, off the Carkeek CSO outfall

fn: TSDCalc10.cls

Table F-21: Carkeek CSO Treatment Plant - Reasonable Potential to Exceed the Water Quality Standards

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

Parameter	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	State Water Quality Standard		Max concentration at edge of...		LIMIT REQ'D?	Effluent percentile value	CALCULATIONS	Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
	Acute	Chronic		Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone			Pn		CV	s	n				
			ug/L	ug/L	ug/L	ug/L	ug/L				ug/L							
ARSENIC (dissolved)	1.00		1.200	69	36	1.28	1.25	NO	0.95	0.473	3.25	0.60	0.55	4	2.59	93	146	
CADMIUM	0.994	0.994	0.070	42.00	9.3	0.07	0.07	NO	0.95	0.473	0.17	0.60	0.55	4	2.59	93	146	
CHROMIUM(HEX)	0.993	0.993	0.170	1100	50	0.25	0.22	NO	0.95	0.473	3.04	0.60	0.55	4	2.59	93	146	
COPPER	0.83	0.83	0.390	4.80	3.10	0.88	0.70	NO	0.95	0.473	21.60	0.60	0.55	4	2.59	93	146	
LEAD	0.951	0.95	0.018	210.00	8.10	0.25	0.16	NO	0.95	0.473	8.62	0.60	0.55	4	2.59	93	146	
NICKEL	0.99	0.99	0.430	74.00	8.20	0.55	0.50	NO	0.95	0.473	4.35	0.60	0.55	4	2.59	93	146	
ZINC	0.946	0.946	1.200	90.00	81.00	3.47	2.64	NO	0.95	0.473	86.70	0.60	0.55	4	2.59	93	146	
Ammonia				10012.00	1504.00	2.00	1.27	NO	0.95	0.050	30.00	0.60	0.55	1	6.20	93	146	No effl. Samples analyzed for NH3, assumed value
Chlorine				13.00	7.50	37.97	24.18	YES	0.95	0.878	2705.00	0.60	0.55	23	1.31	93	146	

Table F-22: Carkeek CSO Treatment Plant - Chlorine Limit to Meet Water Quality Limit

The anti-backsliding provision under the federal regulations [CFR 122.44(l)] requires that the chlorine limit be based on the more stringent limit established in the previous permit since it has been shown to be technologically achievable. The following table was used to calculate the chlorine limit based on the new dilution factor and that from the previous permit.

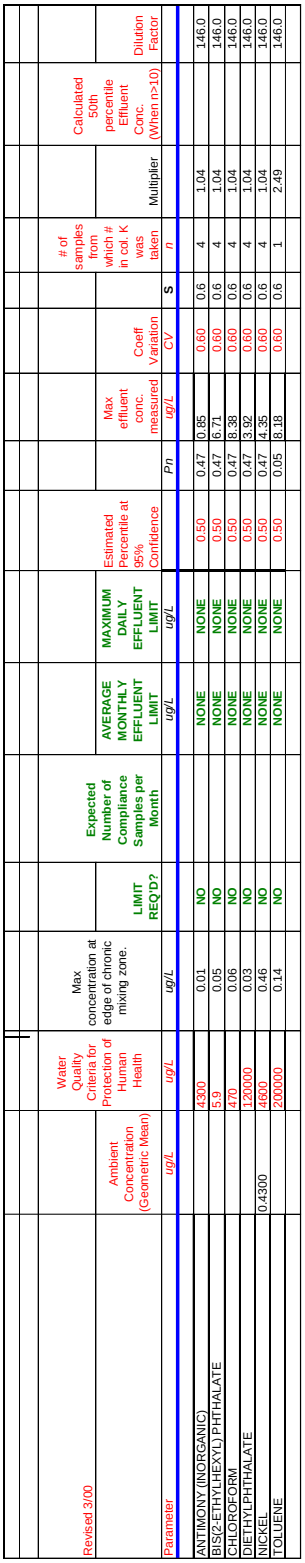
Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

Permit Limit Calculation Summary

	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator	Metal Criteria Translator	Ambient Concentration	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)	Comments
PARAMETER			Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	ug/L	ug/L	
Chlorine	93.0	146.00				13.00	7.5000	**602.6**	**1209.0**	**New DF**
Chlorine	38.0	197.00				13.00	7.5000	**246.2**	**494.0**	**Previous Permit**
								0.5 mg/L	**0.75 mg/L**	**Technology-Based**

	Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit limit calculation				
	WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	LTA Coeff. Var. (CV)	LTA Prob'y Basis	Limiting LTA	Coeff. Var. (CV)	AML Prob'y Basis	MDL Prob'y Basis	# of Samples per Month	
PARAMETER	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*decimal*	*decimal*	*ug/L*	*decimal*	*decimal*	*decimal*	*n*	
Chlorine	1209	1095.00	388.2	577.5	0.60	0.99	388.2	0.60	0.95	0.99	4.00	1.00
Chlorine	494	1477.50	158.6	779.3	0.60	0.99	158.6	0.60	0.95	0.99	4.00	1.00

Table F-23: Carkeek CSO Treatment Plant - Reasonable Potential to Exceed Human Health Criteria



Revised 3/00	Ambient Concentration (Geometric Mean)	Water Quality Criteria for Protection of Human Health	Max. concentration at edge of chronic mixing zone.	LIMIT REQ'D?	Expected Number of Compliance Samples per Month	AVERAGE MONTHLY EFFLUENT LIMIT	MAXIMUM DAILY EFFLUENT LIMIT	Estimated Percentile at 95% Confidence	Pn	Max effluent conc. measured	Coeff Variation	S	# of samples from which # in col. K was taken	Multiplier	Calculated 50th percentile Effluent Conc. (When n>10)	Dilution Factor
Parameter	ug/L	ug/L	ug/L			ug/L	ug/L			ug/L	CV		n			
ANTIMONY (INORGANIC)		4300	0.01	NO		NONE	NONE	0.50	0.47	0.85	0.60	0.6	4	1.04		146.0
BIS(2-ETHYLHEXYL) PHTHALATE		5.9	0.05	NO		NONE	NONE	0.50	0.47	6.71	0.60	0.6	4	1.04		146.0
CHLOROFORM		470	0.06	NO		NONE	NONE	0.50	0.47	8.38	0.60	0.6	4	1.04		146.0
DIETHYLPHTHALATE		120000	0.03	NO		NONE	NONE	0.50	0.47	3.92	0.60	0.6	4	1.04		146.0
NICKEL	0.4300	4600	0.46	NO		NONE	NONE	0.50	0.47	4.35	0.60	0.6	4	1.04		146.0
TOLUENE		200000	0.14	NO		NONE	NONE	0.50	0.05	8.18	0.60	0.6	1	2.49		146.0

Table F-24: Carkeek CSO Treatment Plant - Ambient Monitoring Data Summary

Summary of ambient monitoring data from CK200P

Carkeek CK200P		Salinity (psu)	Temperature (deg C)	Density (sigma-t) (kg/m3)
MIN		8.165	6.8	6.28
MAX		30.927	14.6	23.59
AVG		29.534416	10.56032609	22.5803804
90%		30.5033	12.93	23.33
95%		30.62915	13.365	23.4765

Table F-25: Carkeek CSO Treatment Plant - Simple Dilution Assessment for Temperature and Fecal Coliform Ambient

Carkeek WWTP Receiving Water Calculations

Chronic Dilution Factor	146	1	
Acute Dilution Factor	93		
Facility Design Max Month Flow	20.00	mgd	
	30.95	cfs	

Fecal Coliform Dilution Calculation

Receiving Water Fecal Coliform	3	#/100 ml	assumed, FC not available at CK200P
Effluent Fecal Coliform - worst case	400	#/100 ml	
Downstream Fecal Coliform	**6**	#/100 ml	
Difference between mixed and ambient	**3**	#/100 ml	
Primary Contact and Shellfish Habitat Surface Water Criteria	*14*	*#/100 ml*	*Current state WAC designation*

Conclusion: At design flow, the discharge has small impact on receiving water fecal coliform concentration.

Temperature Dilution Calculation

Receiving Water Temperature	14.60	ºC	Ambient Monitoring CK200P
Effluent Temperature - worst case	23.3	ºC	As reported in permit application for W. Pt.
Downstream Temperature	**14.66**	ºC	
Difference between mixed and ambient	**0.06**	ºC	
Surface Water Criteria - Extraordinary Quality Aquatic Life Use	*13.0*	ºC	*Current state WAC designation*

Conclusion: At design flow, the discharge has small impact on receiving temperature.

Table F-26: Carkeek CSO Treatment Plant – Assessment for Impacts to Dissolved Oxygen

Carkeek CSO Treatment Plant

Dissolved oxygen concentration following initial dilution.
References: EPA/600/6-85/002b and EPA/430/9-82-011

INPUT		Source
1. Dilution Factor at Mixing Zone Boundary:	146	Chronic dilution factor
2. Ambient Dissolved Oxygen Concentration (mg/L):	6	Assumed Min. at CK200P
3. Effluent Dissolved Oxygen Concentration (mg/L):	7	NPDES permit application - Not Reported. Used assumed value
4. Effluent Immediate Dissolved Oxygen Demand (mg/L):	20	NPDES permit application - Not Reported. Used assumed value
OUTPUT		
Dissolved Oxygen at Mixing Zone Boundary (mg/L):	5.87	
Decrease of 0.2 mg/L = No Measurable Change	0.13	

Table F-27: Carkeek CSO Treatment Plant – Dilution Assessment for pH

Calculation of pH of a mixture in seawater.
Based on the CO2SYS program (Lewis and Wallace, 1998)
http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT		
1. MIXING ZONE BOUNDARY CHARACTERISTICS		
Dilution factor at mixing zone boundary	146.000	
Depth at plume trapping level (m)	2.000	assumed
2. BACKGROUND RECEIVING WATER CHARACTERISTICS		
Temperature (deg C):	14.60	CK200P, max
pH:	8.00	not available, assumed value
Salinity (psu):	29.50	CK200P, avg
Total alkalinity (meq/L)	2.30	not available, left as default
3. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	20.60	W Pt. winter max day temp
pH:	8.00	not available, assumed value
Salinity (psu)	0.00	not available, assumed value
Total alkalinity (meq/L):	2.00	not available, left as default
4. CLICK THE 'calculate" BUTTON TO UPDATE OUTPUT RESULTS >>>	calculate	
OUTPUT		
CONDITIONS AT THE MIXING ZONE BOUNDARY		
Temperature (deg C):	14.64	
Salinity (psu)	29.30	
Density (kg/m^3)	1021.67	
Alkalinity (mmol/kg-SW):	2.25	
Total Inorganic Carbon (mmol/kg-SW):	2.08	
pH at Mixing Zone Boundary:	8.00	

Table F-28: Elliott West CSO Treatment Plant – Water Quality Criteria for Detected Pollutants

FACILITY: EWCSO
FILENAME:
RUN DATE: 9/3/2008
PREPARED BY: Henley

Red font = National Toxics Rule (40 CFR 131.36)
Blue font = EPA National Recommended Water Quality Criteria:2002 (EPA 822-R-02-47)
Green font = Other source - see comment
Black font = WAC 173-201A (Nov. 1997)

Input Required Data **Units**
ENTER RECEIVING WATER TSS (IF UNKNOWN LEAVE 0 mg/L
IF RECEIVING WATER TSS IS ANNUAL DATA INSERT A, OR S
IF FROM CRITICAL PERIOD INSERT S>
HARDNESS VALUE USED FOR HARDNESS DEPENDENT 50 mg/L at $CaCO_3$
LIMITS>>>>

* = INSUFFICIENT DATA TO DEVELOP CRITERIA

VALUE PRESENTED IS TH L.O.E.L- LOWEST OBSERVED

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

Pollutant Detected input 'Y'	Pollutant	CAS No.	NPDES Application Reference No.	Hardness or pH dependent	Conversion Factor	Conversion Factor Chronic	Priority Pollutants	Carcinogen	Water Quality Criteria - Marine - Acute	Water Quality Criteria - Marine - Chronic	Human Health Criteria - Marine	Organoleptic Effects	Metals Translators Marine - Acute	Metals Translators Marine - Chronic
170	ANTIMONY (INORGANIC)	7440360	1M				Y	N			4300			
588	BIS(2-ETHYLHEXYL) PHTHALATE	117817	13B				Y	Y			5.9			
120	CHLOROFORM	67663	11V				Y	Y			470			
3.43	DIETHYLPHTHALATE	84662	24B				Y	N			120000			
22.00	MERCURY	7439976	8M				Y	N	1.80	0.0250	0.15		0.85	
7.20	NICKEL	7440020	9M	50.0			Y	N	74.00	8.20	4600		0.99	0.99
7.49	TOLUENE	108883	25V				Y	N			200000			

Updated the formulas and values to match with WAC 173-201A in December of 1992. Enter the hardness value for the receiving water for hardness dependent metals in B200 and TSS values in B199.
Spreadsheet updated with human health criteria by Gary Bailey in March 1995 and checked by G. Shervey
Metal criteria changed to those announced in FR Vol. 60 No.86 5/4/95 (1.095)
Metal translators added 6/96 (based on work by Pelletier and FR Vol 60, No.86 5/4/95)
Criteria values updated 9/03

Table F-29: Elliott West CSO Treatment Plant - Ammonia Calculation Spreadsheet

Ammonia Calculation Spreadsheet

Calculation of seawater fraction of un-ionized ammonia
from Hampson (1977). Un-ionized ammonia criteria for
salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

Facility: EWCSO
Permit No: WA-002918-1

INPUT*		
1. Temperature, deg C (90th percentile):	13.2	
2. pH, (90th percentile):	8.0	assumed
3. Salinity, g/Kg (90th percentile):	30.3	
OUTPUT		
1. Pressure (atm; EPA criteria assumes 1 atm):	1.0	
2. Molal Ionic Strength (not valid if >0.85):	0.407	
3. pKa8 at 25 deg C (Whitfield model "B"):	9.292	
4. Percent of Total Ammonia Present as Unionized:	2.362%	
5. Unionized ammonia criteria (mg un-ionized NH3 per liter) from EPA 440/5-88-004		
Acute:	0.233	
Chronic:	0.035	
6. Total Ammonia Criteria (mg/L as NH3)		
Acute:	9.86	
Chronic:	1.48	
7. Total Ammonia Criteria (mg/L as NH3-N)		
Acute:	8.11	8108.36
Chronic:	1.22	1217.99

* Data from ambient monitoring station LTED04, 1 mile south of EWCSO outfall

Table F-30: Elliott West CSO Treatment Plant - Reasonable Potential to Exceed the Water Quality Standards

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56.
User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

					State Water Quality Standard		Max concentration at edge of...			CALCULATIONS											
Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	LIMIT REQ'D?	Effluent percentile value	Pn	Max effluent conc. measured (metal as total recoverable)	Coeff Variation CV	s	# of samples n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
				ug/L	ug/L	ug/L	ug/L				ug/L							
ARSENIC (dissolved)	1.00		1.400	69	36	2.29	2.03	NO	0.95	0.607	3.88	0.60	0.55	6	2.14	8	11	
CADMIUM	0.994	0.994	0.072	42.00	9.3	9.86	7.01	NO	0.95	0.607	35.90	0.60	0.55	6	2.14	8	11	
CHROMIUM(HEX)	0.993	0.993	0.370	1100	50	2.57	1.93	NO	0.95	0.607	8.24	0.60	0.55	6	2.14	8	11	
COPPER	0.83	0.83	0.910	4.80	3.10	7.78	5.78	YES	0.95	0.549	45.80	0.24	0.24	5	1.43	8	11	Ran CV
LEAD	0.951	0.95	0.083	210.00	8.10	4.09	2.92	NO	0.95	0.607	22.00	0.30	0.29	6	1.50	8	11	Ran CV
MERCURY	0.85			1.80	0.0250	0.03	0.02	NO	0.95	0.607	0.12	0.60	0.55	6	2.14	8	11	
NICKEL	0.99	0.99	0.480	74.00	8.20	2.38	1.82	NO	0.95	0.607	7.20	0.60	0.55	6	2.14	8	11	
SILVER	0.85			1.90	NA	0.69	0.57		0.95	0.607	2.94	0.60	0.55	6	2.14	8	11	
ZINC	0.946	0.946	4.300	90.00	81.00	35.44	26.38	NO	0.95	0.607	122.00	0.60	0.55	6	2.14	8	11	
AMMONIA				8108.00	1217.00	23.84	16.90	NO	0.95	0.050	30.00	0.60	0.55	1	6.20	8	11	No effl. Samples analyzed for NH3, assumed value
CHLORINE				13.00	7.50	275.96	195.68	YES	0.95	0.847	1524.00	0.60	0.55	18	1.41	8	11	

Table F-31: Elliott West CSO Treatment Plant - Chlorine Limit to Meet Water Quality Limit

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

Permit Limit Calculation Summary

PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration *ug/L*	Water Quality Standard Acute *ug/L*	Water Quality Standard Chronic *ug/L*	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L	Comments
CHLORINE	8.0	11.00				13.00	7.5000	**51.8**	**104.0**	
COPPER	8.0	11.00				4.80	3.10	**19.1**	**38.4**	

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations

Statistical variables for permit limit calculation

WLA Acute *ug/L*	WLA Chronic *ug/L*	LTA Acute *ug/L*	LTA Chronic *ug/L*	LTA Coeff. Var. (CV) *decimal*	LTA Prob'y Basis *decimal*	Limiting LTA *ug/L*	Coeff. Var. (CV) *decimal*	AML Prob'y Basis *decimal*	MDL Prob'y Basis *decimal*	# of Samples per Month *n*	
				0.60	0.99		0.60	0.95	0.99	4.00	1.00
104	82.50	33.4	43.5	0.60	0.99	33.4	0.60	0.95	0.99	4.00	1.00
				0.60	0.99		0.60	0.95	0.99	4.00	1.00
38	34.10	12.3	18.0	0.60	0.99	12.3	0.60	0.95	0.99	4.00	1.00

This spreadsheet calculates water quality based permit limits based on the two value steady state model using the State Water Quality standards contained in WAC 173-201A. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 99. Last revision date 9/98. Written by G. Shervey

Table F-32: Elliott West CSO Treatment Plant - Reasonable Potential to Exceed Human Health Criteria

Revised 3/00	Ambient Concentration (Geometric Mean)	Water Quality Criteria for Protection of Human Health	Max concentration at edge of chronic mixing zone.	LIMIT REQ'D?	Expected Number of Compliance Samples per Month	AVERAGE MONTHLY EFFLUENT LIMIT	MAXIMUM DAILY EFFLUENT LIMIT	Estimated Percentile at 95% Confidence		Max effluent conc. measured	Coeff Variation		# of samples from which # in col. K was taken	Multiplier	Calculated 50th percentile Effluent Conc. (When n>10)	Dilution Factor
Parameter	*ug/L*	*ug/L*	*ug/L*			*ug/L*	*ug/L*		*Pn*	*ug/L*	*CV*	**S**	*n*			
ANTIMONY (INORGANIC)		4300	0.13	NO		NONE	NONE	0.50	0.61	1.70	0.60	0.6	6	0.86		11.0
BIS(2-ETHYLHEXYL) PHTHALATE		5.9	0.46	NO		NONE	NONE	0.50	0.61	5.88	0.60	0.6	6	0.86		11.0
CHLOROFORM		470	0.27	NO		NONE	NONE	0.50	0.05	1.20	0.60	0.6	1	2.49		11.0
DIETHYLPHTHALATE		120000	0.27	NO		NONE	NONE	0.50	0.61	3.43	0.60	0.6	6	0.86		11.0
MERCURY		0.15	0.01	NO		NONE	NONE	0.50	0.37	0.12	0.60	0.6	3	1.20		11.0
NICKEL		4600	1.00	NO		NONE	NONE	0.50	0.61	7.20	0.60	0.6	6	0.86		11.0
TOLUENE	0.4800	200000	1.70	NO		NONE	NONE	0.50	0.05	7.49	0.60	0.6	1	2.49		11.0

Table F-33: Elliott West CSO Treatment Plant - Ambient Monitoring Data Summary

Summary of ambient monitoring data from PSB003

LTED04		Salinity (psu)	Temperature (deg C)	Density (sigma-t) (kg/m3)
MIN		13.997	4.5	11.09
MAX		30.715	15.6	23.5
AVG		28.81583	10.69497992	21.99662651
90%		30.2963	13.23	23.05
95%		30.4249	13.7	23.23

Table F-34: Elliott West CSO Treatment Plant - Simple Dilution Assessment for Temperature and Fecal Coliform Ambient

Elliott West CSO Receiving Water Calculations

Chronic Dilution Factor	11	1	
Acute Dilution Factor	8		
Facility Design Max Month Flow	50.00	mgd	assumed
	77.37	cfs	

Fecal Coliform Dilution Calculation

Receiving Water Fecal Coliform	3	#/100 ml	assumed, FC not sampled at LTED04
Effluent Fecal Coliform - worst case	400	#/100 ml	
Downstream Fecal Coliform	**36**	#/100 ml	
Difference between mixed and ambient	**33**	#/100 ml	
Primary Contact and Shellfish Habitat Surface Water Criteria	*14*	*#/100 ml*	*Current state WAC designation*

Conclusion: At design flow, the discharge has reasonable potential for violation of water quality standards for fecal coliform.

Temperature Dilution Calculation

Receiving Water Temperature	15.60	ºC	Ambient Monitoring LTED04
Effluent Temperature - worst case	20.6	ºC	As reported in permit application for W. Pt. - Max Summer Day
Downstream Temperature	**16.02**	ºC	
Difference between mixed and ambient	**0.42**	ºC	
Surface Water Criteria - Extraordinary Quality Aquatic Life Use	*13.0*	ºC	*Current state WAC designation*

Conclusion: At design flow, the discharge has reasonable potential for violation of water quality standards for temperature (<0.3ºC).

Table F-35: Elliott West CSO Treatment Plant – Assessment for Impacts to Dissolved Oxygen

Elliott West CSO Treatment Plant

Dissolved oxygen concentration following initial dilution.
References: EPA/600/6-85/002b and EPA/430/9-82-011

INPUT		Source
1. Dilution Factor at Mixing Zone Boundary:	11	Chronic dilution factor
2. Ambient Dissolved Oxygen Concentration (mg/L):	6	Assumed Min. at LTED 04
3. Effluent Dissolved Oxygen Concentration (mg/L):	7	NPDES permit application - Not Reported. Used assumed value
4. Effluent Immediate Dissolved Oxygen Demand (mg/L):	20	NPDES permit application - Not Reported. Used assumed value
OUTPUT		
Dissolved Oxygen at Mixing Zone Boundary (mg/L):	4.27	
Decrease of 0.2 mg/L = No Measurable Change	1.73	

Table F-36: Elliott West CSO Treatment Plant – Dilution Assessment for pH

Calculation of pH of a mixture in seawater.
Based on the CO2SYS program (Lewis and Wallace, 1998)
http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT		
1. MIXING ZONE BOUNDARY CHARACTERISTICS		
Dilution factor at mixing zone boundary	11.000	
Depth at plume trapping level (m)	2.000	assumed
2. BACKGROUND RECEIVING WATER CHARACTERISTICS		
Temperature (deg C):	15.60	LTED04, max
pH:	8.00	not available, assumed value
Salinity (psu):	28.80	LTED04, avg
Total alkalinity (meq/L)	2.30	not available, left as default
3. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	20.50	W Pt. winter max day temp
pH:	8.00	not available, assumed value
Salinity (psu)	0.00	not available, assumed value
Total alkalinity (meq/L):	2.00	not available, left as default
4. CLICK THE 'calculate" BUTTON TO UPDATE OUTPUT RESULTS >>>	calculate	
OUTPUT		
CONDITIONS AT THE MIXING ZONE BOUNDARY		
Temperature (deg C):	16.05	
Salinity (psu)	26.18	
Density (kg/m^3)	1018.98	
Alkalinity (mmol/kg-SW):	2.23	
Total Inorganic Carbon (mmol/kg-SW):	2.07	
pH at Mixing Zone Boundary:	8.01	

Table F-37: MLK/Henderson CSO Treatment Plant – Water Quality Criteria for Detected Pollutants

No priority pollutant data to run reasonable potential.

Table F-38: MLK/Henderson CSO Treatment Plant - Ammonia Calculation Spreadsheet

Freshwater un-ionized ammonia criteria based on EPA Gold Book
(EPA 440/5-86-001) as revised by Heber and Ballentine (1992).

Based on Lotus File NH3FRES2.WK1 Revised 12-Dec-94

INPUT		
1. Temperature (deg C; 0<T<30):	17.1	90%
2. pH (6.5<pH<9.0):	7.84	90%
3. Total Ammonia (ug N/L):	200.0	Assumed
4. Acute TCAP (Salmonids present- 20; absent- 25):	20	
5. Chronic TCAP (Salmonids present- 15; absent- 20):	15	

OUTPUT	
1. Intermediate Calculations:	
Acute FT:	1.2218
Chronic FT:	1.4125
FPH:	1.0905
RATIO:	13.5000
pKa:	9.4940
Fraction Of Total Ammonia Present As Un-ionized:	2.1702%
2. Sample Un-ionized Ammonia Concentration (ug/L as NH3-N):	4.3
3. Un-ionized Ammonia Criteria:	
Acute (1-hour) Un-ionized Ammonia Criterion (ug/L as NH3-N):	160.4
Chronic (4-day) Un-ionized Ammonia Criterion (ug/L as NH3-N):	31.6
4. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (ug/L as NH3-N):	7,391
Chronic Total Ammonia Criterion (ug/L as NH3-N):	1,457

Table F-39: MLK/Henderson CSO Treatment Plant - Reasonable Potential to Exceed the Water Quality Standards

CALCULATIONS

Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) ug/L	State Water Quality Standard Acute ug/L	State Water Quality Standard Chronic ug/L	Max concentration at edge of... Acute Mixing Zone ug/L	Max concentration at edge of... Chronic Mixing Zone ug/L	LIMIT REQ'D?	Effluent percentile value	Pn	Max effluent conc. measured (metals as total recoverable) ug/L	Coeff Variation CV	s	# of samples n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
AMMONIA				7391.00	1457.00	23.84	16.90	NO	0.95	0.050	30.00	0.60	0.55	1	6.20	8	11	No effl. Samples analyzed for NH3, assumed value
CHLORINE				13.00	7.50	54.32	38.52	YES	0.95	0.847	300.00	0.60	0.55	18	1.41	8	11	

Does not include PP data

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

Table F-40: MLK/Henderson CSO Treatment Plant - Chlorine Limit to Meet Water Quality Limit

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

Permit Limit Calculation Summary

	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator	Metal Criteria Translator	Ambient Concentration	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)	Comments
PARAMETER			Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	ug/L	ug/L	
Chlorine	1.9	10.30				13.00	7.5000	**15.4**	**38.9**	

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations

This spreadsheet calculates water quality based permit limits based on the two value steady state model using the State Water Quality standards contained in WAC 173-201A. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 99. Last revision date 9/98. Written by G. Shervey

al variables for permit limit calculation

WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	LTA Coeff. Var. (CV)	LTA Prob'y Basis		AML Prob'y Basis	MDL Prob'y Basis	# of Samples per Month	
ug/L	*ug/L*	*ug/L*	*ug/L*	*decimal*	*decimal*		*decimal*	*decimal*	*n*	
25	77.25	7.9	40.7	0.60	0.99		0.95	0.99	4.00	1.00

Table F-41: MLK/Henderson CSO Treatment Plant - Reasonable Potential to Exceed Human Health Criteria

No priority pollutant data to run reasonable potential.

Table F-42: MLK/Henderson CSO Treatment Plant - Ambient Monitoring Data Summary

Summary of ambient monitoring data available.

Table F-43: MLK/Henderson CSO Treatment Plant - Simple Dilution Assessment for Temperature and Fecal Coliform Ambient

MLK CSO Receiving Water Calculations

Chronic Dilution Factor	10	1	
Acute Dilution Factor	2		
Facility Design Max Month Flow	50.00	mgd	assumed
	77.37	cfs	

Fecal Coliform Dilution Calculation

Receiving Water Fecal Coliform	112	#/100 ml	90%, Sta 0309
Effluent Fecal Coliform - worst case	400	#/100 ml	
Downstream Fecal Coliform	**137**	#/100 ml	
Difference between mixed and ambient	**25**	#/100 ml	
Primary Contact and Shellfish Habitat Surface Water Criteria	*14*	*#/100 ml*	*Current state WAC designation*

Conclusion: At design flow, the discharge has reasonable potential for violation of water quality standards for fecal coliform.

Temperature Dilution Calculation

Receiving Water Temperature	17.10	ºC	90% Sta 0309
Effluent Temperature - worst case	20.0	ºC	assumed
Downstream Temperature	**17.36**	ºC	
Difference between mixed and ambient	**0.26**	ºC	
Surface Water Criteria - Extraordinary Quality Aquatic Life Use	*13.0*	ºC	*Current state WAC designation*

Conclusion: At design flow, the discharge does not have a reasonable potential for violation of water quality standards for temperature (<0.3ºC).

Table F-44: MLK/Henderson CSO Treatment Plant – Assessment for Impacts to Dissolved Oxygen

Streeter-Phelps analysis of critical dissolved oxygen sag.
red = # from facility plan, black = calculated numbers, blue = # are best estimate

	Data Source			Acute Dil. Basis		
River Depth (feet)	Facility Plan	12	12	12	12	
River Surface Width (feet)	Facility Plan	208	208	208	208	
River Velocity (fps)	Facility Plan	0.26	**1.28**	0.77	0.26	
	Facility Plan	10th Percentile	90th Percentile	50th Percentile	10th Percentile	
River Flow (cfs)	Calculated	648.96	3194.88	1921.92	648.96	
Effluent Flow (MGD)	Facility Plan	100.6	**100.6**	100.6	50	
Effluent Flow (cfs)	Calculated	155.66	155.66	155.66	77.37	

INPUT			**Case 1**	**Case 2**	**Case 3**	**Case 4**
				Midpt. River flow	High Flow	Extreme case
1. EFFLUENT CHARACTERISTICS						
Discharge (cfs):			156	156	156	77
CBOD5 (mg/L):			40	40	40	40
NBOD (mg/L):			2.6	2.6	2.6	2.6
Dissolved Oxygen (mg/L):			2	2	2	2
Temperature (deg C):			7.2	7.2	7.2	7.2
2. RECEIVING WATER CHARACTERISTICS						
Upstream Discharge (cfs):			648.96	3194.88	1921.92	648.96
Upstream CBOD5 (mg/L):			1.5	1.5	1.5	1.5
Upstream NBOD (mg/L):			1	1	1	1
Upstream Dissolved Oxygen (mg/L):			9	9	9	9
Upstream Temperature (deg C):			6.5	6.5	6.5	6.5
Elevation (ft NGVD):			20	20	20	20
Downstream Average Channel Slope (ft/ft):			0.0009	0.0009	0.0009	0.0009
Downstream Average Channel Depth (ft):			12	12	12	12
Downstream Average Channel Velocity (fps):	u		0.26	1.28	0.77	0.26
3. REAERATION RATE (Base e) AT 20 deg C (day^-1):			0.16	0.35	0.27	0.16
Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested Values	Suggested Values	Suggested Values	Suggested Values
Churchill	1.5 - 6	2 - 50	0.05	0.23	0.14	0.05
O'Connor and Dobbins	.1 - 1.5	2 - 50	0.16	0.35	0.27	0.16
Owens	.1 - 6	1 - 2	0.09	0.26	0.18	0.09
Tsivoglou-Wallace	.1 - 6	.1 - 2	0.97	2.65	2.87	0.97
4. BOD DECAY RATE (Base e) AT 20 deg C (day^-1):			0.39	0.39	0.39	0.41
Reference			Suggested Value	Suggested Value	Suggested Value	Suggested Value
Wright and McDonnell, 1979			0.39	0.39	0.39	0.41
OUTPUT						
1. INITIAL MIXED RIVER CONDITION						
CBOD5 (mg/L):			8.9	3.3	4.4	5.6
NBOD (mg/L):			1.3	1.1	1.1	1.2
Dissolved Oxygen (mg/L):		Co	7.6	8.7	8.5	8.3
Temperature (deg C):			6.635	6.533	6.552	6.575
2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)						
Reaeration (day^-1):		ka	0.116	0.256	0.199	0.116
BOD Decay (day^-1):		kd	0.211	0.210	0.210	0.220
3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU						
Initial Mixed CBODU (mg/L):			13.2	4.8	6.4	8.2
Initial Mixed Total BODU (CBODU + NBOD, mg/L):		Lo	14.5	5.9	7.6	9.4
4. INITIAL DISSOLVED OXYGEN DEFICIT						
Saturation Dissolved Oxygen (mg/L):		Cs	12.242	12.273	12.267	12.260
Initial Deficit (mg/L):			4.60	3.60	3.79	4.01
5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days):			4.89	1.19	2.54	4.40
6. DISTANCE TO CRITICAL DO CONCENTRATION (miles):			20.83	24.96	31.99	18.71
7. CRITICAL DO DEFICIT (mg/L):			9.39	3.77	4.69	6.80
8. CRITICAL DO CONCENTRATION (mg/L):			2.86	8.50	7.57	5.46
WQS, class B, Marine, minimum DO, mg/L			5.0	5.0	5.0	5.0

Table F-45: MLK/Henderson CSO Treatment Plant – Dilution Assessment for pH

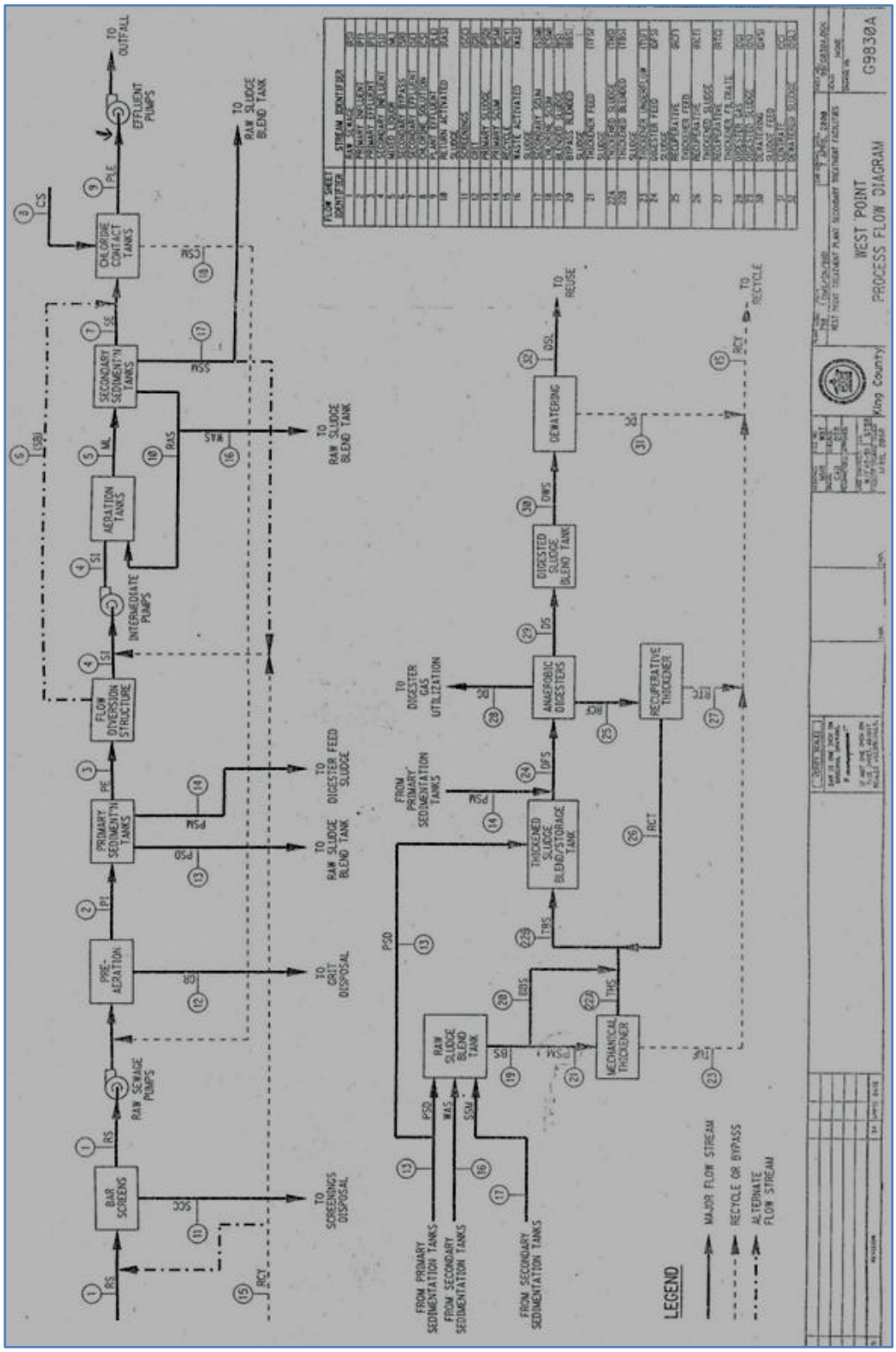
Calculation of pH of a mixture of two flows. Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Based on Lotus File PHMIX2.WK1 Revised 19-Oct-93

INPUT		
1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	10.300	
2. UPSTREAM/BACKGROUND CHARACTERISTICS		
Temperature (deg C):	17.10	90%
pH:	7.84	90%
Alkalinity (mg CaCO3/L):	50.00	assumed
3. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	20.50	assumed
pH:	8.50	assumed
Alkalinity (mg CaCO3/L):	150.00	assumed

OUTPUT	
1. IONIZATION CONSTANTS	
Upstream/Background pKa:	6.40
Effluent pKa:	6.38
2. IONIZATION FRACTIONS	
Upstream/Background Ionization Fraction:	0.96
Effluent Ionization Fraction:	0.99
3. TOTAL INORGANIC CARBON	
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	51.83
Effluent Total Inorganic Carbon (mg CaCO3/L):	151.13
4. CONDITIONS AT MIXING ZONE BOUNDARY	
Temperature (deg C):	17.43
Alkalinity (mg CaCO3/L):	59.71
Total Inorganic Carbon (mg CaCO3/L):	61.47
pKa:	6.40
pH at Mixing Zone Boundary:	7.93

APPENDIX G—PROCESS FLOW DIAGRAMS



APPENDIX H—RESPONSE TO COMMENTS

The response to the public hearing and all comments is provided in the King County West Point WWTP Responsiveness Summary Document.

APPENDIX I—INDUSTRIAL DISCHARGERS TO COUNTY'S WEST POINT SYSTEM

Acu-Line Corporation
Customer Type: METAL FINISHING - CFR 433
Permit #: 7231-03 **Permit Status:** ACTIVE
Locator: A1036 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ZINC	METAL FINISHING
CADMIUM	METAL FINISHING
CHROMIUM	METAL FINISHING
PH ACID	METAL FINISHING
NICKEL	METAL FINISHING
COPPER	METAL FINISHING
PH CAUSTIC	METAL FINISHING
LEAD	METAL FINISHING

Alaskan Copper Works - 6th Ave.
Customer Type: METAL FINISHING - CFR 433
Permit #: 7238-03 **Permit Status:** ACTIVE
Locator: A4010 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
NICKEL	PASSIVATION
PH ACID	PASSIVATION
PH CAUSTIC	DEGREASER
COPPER	PASSIVATION OF STAINLESS STEEL
PH CAUSTIC	PASSIVATION
ZINC	PASSIVATION
CHROMIUM	PASSIVATION OF STAINLESS STEEL

Alaskan Copper Works - Marginal Way
Customer Type: METAL FINISHING - CFR 433
Permit #: 7201-03 **Permit Status:** ACTIVE
Locator: A4009 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH ACID	NITRIC ACID
NICKEL	PASSIVAITON
CADMIUM	PASSIVATION
CHROMIUM	PASSIVATION
PH CAUSTIC	NEUTRALIZATION
ZINC	PASSIVATION

Amgen Corporation (Bothell)
Customer Type: BIOTECHNOLOGY - BENCH SCA
Permit #: 7648-04 **Permit Status:** ACTIVE
Locator: A20312 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	FERMENTATION AND PURIFICATION
PH ACID	FERMENTATION AND PURIFICATION REAGENTS

Amgen Corporation (Seattle)
Customer Type: BIOTECHNOLOGY - BENCH SCA
Permit #: 7785-01 **Permit Status:** ACTIVE
Locator: A45581 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH ACID	SANITIZATION

TEMPERATURE	SANITIZATION
PH CAUSTIC	SANITIZATION

Locator: A45582 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	SANITIZATION
TEMPERATURE	SANITIZATION
PH ACID	SANITIZATION

Locator: A45583 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	SANITIZATION
PH ACID	SANITIZATION
TEMPERATURE	SANITIZATION

Locator: A45584 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	SANITIZATION
TEMPERATURE	SANITIZATION
PH ACID	SANITIZATION

Arco/BP Petroleum Products Co.

Customer Type: FUELING FACILITY

Permit #: 7592-03 **Permit Status:** ACTIVE

Locator: A4326 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	FUELING PROCESS

Art Brass Plating, Inc.

Customer Type: METAL FINISHING - CFR 433

Permit #: 7722-03 **Permit Status:** ACTIVE

Locator: A4013 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	"
CYANIDE	"
ZINC	"
NICKEL	"
PH ACID	"
CHROMIUM	ELECTROPLATING RINSES

Locator: A40132 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH ACID	"
NICKEL	"
CHROMIUM	ELECTROPLATING RINSES
CYANIDE	"
ZINC	"
COPPER	"

Asko Processing, Inc.

Customer Type: ELECTROPLATING - CFR 413

Permit #: 7728-02 **Permit Status:** ACTIVE

Locator: A1013 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	METAL FINISHING
COLOR	DYE PENETRANT
CADMIUM	METAL FINISHING
POLYMERS	PRETREATMENT

CYANIDE	METAL FINISHING
ORGANICS	METAL FINISHING
PH ACID	METAL FINISHING
CHROMIUM	METAL FINISHING
ZINC	METAL FINISHING
FOG NONPOLAR	DYE PENETRANT
COPPER	METAL FINISHING
NICKEL	METAL FINISHING

Locator: A10131 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
POLYMERS	PRETREATMENT
COPPER	METAL FINISHING
NICKEL	METAL FINISHING
ORGANICS	METAL FINISHING
PH CAUSTIC	METAL FINISHING
ZINC	METAL FINISHING
CHROMIUM	METAL FINISHING
CYANIDE	METAL FINISHING
FOG NONPOLAR	DYE PENETRANT
CADMIUM	METAL FINISHING
COLOR	DYE PENETRANT
PH ACID	METAL FINISHING

Avtech Corporation

Customer Type: METAL FINISHING - CFR 433

Permit #: 7030-03 **Permit Status:** ACTIVE

Locator: A10055 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CYANIDE	CHROMATING
PH ACID	CHROMATING
CHROMIUM	CHROMATING

Locator: A10056 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CYANIDE	CHROMATING
CHROMIUM	CHROMATING
PH ACID	CHROMATING

Bayer HealthCare Bothell (formerly Berlex)

Customer Type: BIOTECHNOLOGY - BENCH SCA

Permit #: 7781-01 **Permit Status:** ACTIVE

Locator: A30321 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	BIOPHARMACEUTICAL RESEARCH
PH ACID	BIOPHARMACEUTICAL RESEARCH

Bayer HealthCare Lynnwood (formerly Berlex)

Customer Type: BIOTECHNOLOGY - BENCH SCA

Permit #: 7806-01 **Permit Status:** ACTIVE

Locator: A10861 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	MANUFACTURING
PH ACID	MANUFACTURING

Bayer HealthCare Seattle (formerly Berlex)

Customer Type: BIOTECHNOLOGY - FULL SCAL
Permit #: 7729-03 **Permit Status:** ACTIVE
Locator: A45241 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ORGANICS	PUFIFICATION
PH CAUSTIC	CLEANING
PH ACID	CLEANING

Boeing Commercial Airplane - North Field
Customer Type: METAL FINISHING - CFR 433
Permit #: 7594-03 **Permit Status:** ACTIVE
Locator: A42292 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	METAL FINISHING
CHROMIUM	METAL FINISHING
CYANIDE	METAL FINISHING
NICKEL	METAL FINISHING
LEAD	METAL FINISHING
COPPER	METAL FINISHING
ZINC	METAL FINISHING
ORGANICS	METAL FINISHING

Locator: A42296 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	METAL FINISHING
FOG NONPOLAR	METAL FINISHING
LEAD	METAL FINISHING
ZINC	METAL FINISHING
NICKEL	METAL FINISHING
CHROMIUM	METAL FINISHING
CYANIDE	METAL FINISHING
ORGANICS	METAL FINISHING

Locator: A42299 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	METAL FINISHING
CHROMIUM	METAL FINISHING
FOG NONPOLAR	METAL FINISHING
LEAD	METAL FINISHING
NICKEL	METAL FINISHING
ZINC	METAL FINISHING
ORGANICS	METAL FINISHING
CYANIDE	METAL FINISHING

Locator: A4229C **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
LEAD	METAL FINISHING
CHROMIUM	METAL FINISHING
FOG NONPOLAR	METAL FINISHING
ZINC	METAL FINISHING
COPPER	METAL FINISHING
NICKEL	METAL FINISHING
CYANIDE	METAL FINISHING
ORGANICS	METAL FINISHING

Boeing Company - Plant 2 Facility
Customer Type: METAL FINISHING - CFR 433
Permit #: 7811-02 **Permit Status:** ACTIVE

Locator: A40232 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ZINC	GWR
CHROMIUM	GWR
COPPER	GWR
SILVER	GWR
ARSENIC	BLD 2-66, GWR
FOG NONPOLAR	CAR WASH
ORGANICS	GWR
CADMIUM	GWR, METAL FINISHING
NICKEL	GWR
PCB	CONSTR. DEWATER
LEAD	GWR
PH CAUSTIC	CAR WASH

Locator: A4023H **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
SILVER	GWR
NICKEL	GWR
LEAD	GWR
CHROMIUM	GWR
FOG NONPOLAR	CAR WASH
ARSENIC	BLD 2-66, GWR
CADMIUM	GWR, METAL FINISHING
COPPER	GWR
ZINC	GWR
ORGANICS	GWR
PH CAUSTIC	CAR WASH
PCB	CONSTR. DEWATER

Locator: A4023I **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ARSENIC	BLD 2-66, GWR
NICKEL	GWR
CHROMIUM	GWR
ZINC	GWR
CADMIUM	GWR, METAL FINISHING
LEAD	GWR
SILVER	GWR
PCB	CONSTR. DEWATER
FOG NONPOLAR	CAR WASH
PH CAUSTIC	CAR WASH
ORGANICS	GWR
COPPER	GWR

Locator: A4023J **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ZINC	GWR
CHROMIUM	GWR
PCB	CONSTR. DEWATER
SILVER	GWR
PH CAUSTIC	CAR WASH
CADMIUM	GWR, METAL FINISHING
ARSENIC	BLD 2-66, GWR
LEAD	GWR
NICKEL	GWR
ORGANICS	GWR
FOG NONPOLAR	CAR WASH
COPPER	GWR

Burlington Northern Santa Fe Railway - Interbay Facility
Customer Type: TRANSPORTATION FACILITY
Permit #: 7715-02 **Permit Status:** ACTIVE
Locator: A4153 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	DIESEL LOCOMOTIVE WASHDOWN AND FUELING

Carl Zapffe, Inc.
Customer Type: METAL FINISHING - CFR 433
Permit #: 7654-02 **Permit Status:** ACTIVE
Locator: A1064 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
LEAD	PLATING
NICKEL	PLATING
ZINC	PLATING
SILVER	PLATING
COPPER	PLATING

Carnitech US, Inc. - Terminal 91
Customer Type: METAL FINISHING - CFR 433
Permit #: 7821-01 **Permit Status:** ACTIVE
Locator: A45901 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	STAINLESS STEEL WASH & BUFF
NICKEL	STAINLESS STEEL WASH & BUFF
CHROMIUM	STAINLESS STEEL WASH & BUFF
ZINC	STAINLESS STEEL WASH & BUFF
LEAD	STAINLESS STEEL WASH & BUFF

Container Properties, L.L.C.
Customer Type: GRONDWATER REMEDIATION -
Permit #: 7789-02 **Permit Status:** ACTIVE
Locator: A45431 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	GWR
ORGANICS	GWR - TOLUENE

Crane-Eldec Corp. - Martha Lake
Customer Type: METAL FINISHING - CFR 433
Permit #: 7739-03 **Permit Status:** ACTIVE
Locator: A20611 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
NICKEL	IRRIDITE LINE
ZINC	IRRIDITE LINE
COPPER	IRRIDITE LINE & CLEAN LINE
LEAD	CLEAN LINE
CHROMIUM	IRRIDITE LINE

Locator: A20612 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
NICKEL	IRRIDITE LINE
ZINC	IRRIDITE LINE
LEAD	CLEAN LINE

CHROMIUM	IRRIDITE LINE
COPPER	IRRIDITE LINE & CLEAN LINE

Locator: A20613 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
LEAD	CLEAN LINE
CHROMIUM	IRRIDITE LINE
COPPER	IRRIDITE LINE & CLEAN LINE
NICKEL	IRRIDITE LINE
ZINC	IRRIDITE LINE

DaVinci/Kerry Food & Beverage

Customer Type: FOOD PROCESSING-OTHER

Permit #: 7759-02 **Permit Status:** ACTIVE

Locator: A45311 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
HIGH STRENGTH	COFFEE SYRUPS
PH CAUSTIC	COFFEE SYRUPS
PH ACID	COFFEE SYRUPS

Dawn Food Products, Inc.

Customer Type: FOOD PROCESSING

Permit #: 7043-03 **Permit Status:** ACTIVE

Locator: A41711 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG FLOATABLE	BAKING
PH CAUSTIC	CLEANING BAKING EQUIPMENT
HIGH STRENGTH	BAKING

Locator: A41712 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
HIGH STRENGTH	BAKING
PH CAUSTIC	CLEANING BAKING EQUIPMENT
FOG FLOATABLE	BAKING

Locator: A41713 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	CLEANING BAKING EQUIPMENT
FOG FLOATABLE	BAKING
HIGH STRENGTH	BAKING

Emerald Recycling

Customer Type: CENTRALIZED WASTE TREATME

Permit #: 7690-05 **Permit Status:** ACTIVE

Locator: A42241 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ZINC	TRUCKED WASTE
ORGANICS	TRUCKED WASTE
DIESEL	TRUCKED WASTE
HIGH STRENGTH	TRUCKED WASTE
CHROMIUM	TRUCKED WASTE
FOG FLOATABLE	TRUCKED WASTE
LEAD	TRUCKED WASTE
COPPER	TRUCKED WASTE
NICKEL	TRUCKED WASTE
MERCURY	TRUCKED WASTE
CYANIDE	TRUCKED WASTE

ARSENIC	TRUCKED WASTE
CADMIUM	TRUCKED WASTE
GAS	TRUCKED WASTE
PCB	TRUCKED WASTE
FOG NONPOLAR	TRUCKED WASTE
PH CAUSTIC	TRUCKED WASTE

Emerald Services, Inc.
Customer Type: CHEMICAL TOILET
Permit #: 7725-02 **Permit Status:** ACTIVE
Locator: A4527 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ODOR NOT H2S	CHEM TOILETS/ GRAY H20
COPPER	CHEM TOILETS/ GRAY H20

Foss Maritime Company
Customer Type: BOAT/SHIPYARD
Permit #: 7703-03 **Permit Status:** ACTIVE
Locator: A44011 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
LEAD	BLASTING
ZINC	BLASTING
COPPER	BLASTING

Locator: A44012 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	BLASTING
ZINC	BLASTING
LEAD	BLASTING

GM Nameplate, Inc.
Customer Type: METAL FINISHING - CFR 433
Permit #: 7187-04 **Permit Status:** ACTIVE
Locator: A42511 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	SAME
ZINC	SAME
CHROMIUM	RINSE WATERS
NICKEL	SAME

Locator: A42512 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	SAME
ZINC	SAME
CHROMIUM	RINSE WATERS
NICKEL	SAME

Locator: A42514 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	SAME
CHROMIUM	RINSE WATERS
NICKEL	SAME
ZINC	SAME

Locator: A42516 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ZINC	SAME
COPPER	SAME

NICKEL	SAME
CHROMIUM	RINSE WATERS

Glacier Northwest, Inc.

Customer Type: CEMENT/READYMIX

Permit #: 7740-02 **Permit Status:** ACTIVE

Locator: A2075 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
SOLIDS	CEMENT/LIME RUNOFF
PH CAUSTIC	CEMENT/LIME RUNOFF

Industrial Container Services

Customer Type: BARREL CLEANING

Permit #: 7130-03 **Permit Status:** ACTIVE

Locator: A4073 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	DRUM CLEANING/WASTEWATER TREATMENT
ORGANICS	DRUM CLEANING/WASTEWATER TREATMENT
FOG NONPOLAR	DRUM CLEANING/WASTEWATER TREATMENT
PH ACID	DRUM CLEANING/WASTEWATERTREATMENT

Industrial Plating Corp.

Customer Type: ELECTROPLATING - CFR 413

Permit #: 7004-04 **Permit Status:** ACTIVE

Locator: A4052 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ORGANICS	METAL FINSHING
CADMIUM	METAL FINISHING
CHROMIUM	METAL FINISHING
ZINC	METAL FINSHING
LEAD	METAL FINISHING
NICKEL	METAL FINSHING
PH CAUSTIC	METAL FINSHING
CYANIDE	METAL FINISHING
COPPER	METAL FINISHING
SILVER	METAL FINSHING
PH ACID	METAL FINSHING

Interstate Brands - Aurora

Customer Type: FOOD PROCESSING-BAKERY

Permit #: 7636-02 **Permit Status:** ACTIVE

Locator: A4284 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	CLEANING
FOG FLOATABLE	BAKING
PH ACID	CLEANING

King County SWD - Shoreline Transfer Station

Customer Type: SOLID WASTE - TRANSFER FA

Permit #: 7587-03 **Permit Status:** ACTIVE

Locator: A10432 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CHROMIUM	CONTAMINATED STORMWATER

NICKEL	CONTAMINATED STORMWATER
FOG NONPOLAR	CONTAMINATED STORMWATER
LEAD	CONTAMINATED STORMWATER
COPPER	CONTAMINATED STORMWATER
ZINC	CONTAMINATED STORMWATER
CADMIUM	CONTAMINATED STORMWATER

Permit #: 7587-04 **Permit Status:** ACTIVE
Locator: A10433 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ZINC	CONTAMINATED STORMWATER
NICKEL	CONTAMINATED STORMWATER
CADMIUM	CONTAMINATED STORMWATER
LEAD	CONTAMINATED STORMWATER
CHROMIUM	CONTAMINATED STORMWATER
FOG NONPOLAR	CONTAMINATED STORMWATER
COPPER	CONTAMINATED STORMWATER

King County SWD - Vashon Transfer Station

Customer Type: SOLID WASTE - TRANSFER FA

Permit #: 7675-03 **Permit Status:** ACTIVE
Locator: A4355 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ARSENIC	LEACHATE
CADMIUM	LEACHATE
LEAD	LEACHATE
NICKEL	LEACHATE
COPPER	LEACHATE
ZINC	LEACHATE
MERCURY	LEACHATE
SULFIDES	LEACHATE
CHROMIUM	LEACHATE

King County WTD - Brightwater Conveyance System

Customer Type: CONSTRUCTION DEWATERING

Permit #: 7803-04 **Permit Status:** ACTIVE

Locator: A31371 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	CONSTRUCTION ACTIVITIES
SOLIDS	CONSTRUCTION ACTIVITIES
FOG NONPOLAR	LEAKING HYDRAULIC FLUIDS
OTHER	BENTONITE

Locator: A31372 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
OTHER	BENTONITE
FOG NONPOLAR	LEAKING HYDRAULIC FLUIDS
PH CAUSTIC	CONSTRUCTION ACTIVITIES
SOLIDS	CONSTRUCTION ACTIVITIES

Locator: A31373 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
OTHER	BENTONITE
SOLIDS	CONSTRUCTION ACTIVITIES
PH CAUSTIC	CONSTRUCTION ACTIVITIES
FOG NONPOLAR	LEAKING HYDRAULIC FLUIDS

Locator: A31374 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	LEAKING HYDRAULIC FLUIDS
OTHER	BENTONITE
PH CAUSTIC	CONSTRUCTION ACTIVITIES
SOLIDS	CONSTRUCTION ACTIVITIES

Locator: A31381 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
OTHER	BENTONITE
SOLIDS	CONSTRUCTION ACTIVITIES
PH CAUSTIC	CONSTRUCTION ACTIVITIES
FOG NONPOLAR	LEAKING HYDRAULIC FLUIDS

Locator: A31384 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant

PH CAUSTIC	CONSTRUCTION ACTIVITIES
FOG NONPOLAR	LEAKING HYDRAULIC FLUIDS
OTHER	BENTONITE
SOLIDS	CONSTRUCTION ACTIVITIES

King County WTD - Brightwater Conveyance System II
Customer Type: CONSTRUCTION DEWATERING
Permit #: 7809-02 **Permit Status:** ACTIVE
Locator: A20851 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
SOLIDS	CONSTRUCTION DEWATERING
FOG NONPOLAR	LEAKING HYDRAULIC FLUID
PH CAUSTIC	CONSTRUCTION
GASOLINE (BTEX)	CONTAMINATED
OTHER	BENTONITE

Locator: A20861 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	LEAKING HYDRAULIC FLUID
SOLIDS	CONSTRUCTION DEWATERING
PH CAUSTIC	CONSTRUCTION
GASOLINE (BTEX)	CONTAMINATED
OTHER	BENTONITE

Lafarge - Seattle Plant
Customer Type: CEMENT/READYMIX
Permit #: 7831-01 **Permit Status:** ACTIVE
Locator: A45941 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
SOLIDS	CONTAMINATED STORMWATER
ZINC	CONTAMINATED STORMWATER
COPPER	CONTAMINATED STORMWATER
FOG NONPOLAR	CONTAMINATED STORMWATER

Magnetic And Penetrant Services Co.
Customer Type: METAL FINISHING - CFR 433
Permit #: 7681-03 **Permit Status:** ACTIVE
Locator: A4370 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
NICKEL	METAL FINISHING
LEAD	METAL FINISHING
COLOR	DYE PENETRANT
COPPER	METAL FINISHING
PH ACID	PASSIVATION
ZINC	METAL FINISHING
CHROMIUM	METAL FINISHING

Marine Vacuum Service
Customer Type: CENTRALIZED WASTE TREATME

Permit #: 7676-04 **Permit Status:** ACTIVE
Locator: A4297 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	TREATMENT
DIESEL	TREATMENT
CADMIUM	TREATMENT
GASOLINE (BTEX)	TREATMENT
LEAD	TREATMENT
CHROMIUM	TREATMENT
PCB	TREATMENT

Martin Selig Real Estate - 333 Elliott Avenue West Project
Customer Type: GRONDWATER REMEDIATION -
Permit #: 7822-01 **Permit Status:** ACTIVE
Locator: A45721 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ORGANICS	CONTAMINATED GW

Mastercraft Metal Finishing, Inc.
Customer Type: METAL FINISHING - CFR 433
Permit #: 7233-02 **Permit Status:** ACTIVE
Locator: A4199 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	METAL FINISHING
CHROMIUM	METAL FINISHING
LEAD	METAL FINISHING
CYANIDE	METAL FINISHING
ZINC	METAL FINSIHING
NICKEL	METAL FINISHING

Customer Type: METAL FINISHING - CFR 433
Permit #: 7834-01 **Permit Status:** ACTIVE
Locator: A45991 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	PHOSPHATING LINE
PH ACID	PHOSPHATING LINE
ZINC	PHOSPHATING LINE

National Industrial Concepts

Customer Type: METAL FINISHING - CFR 433

Permit #: 7824-01 **Permit Status:** ACTIVE

Locator: A31481 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	PHOSPHATING LINE

SOLIDS	PHOSPHATING LINE
PH ACID	PHOSPHATING LINE

Pepsi-Cola Company
Customer Type: FOOD PROCESSING-SOFT DRIN
Permit #: 7820-01 **Permit Status:** ACTIVE
Locator: A50061 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH ACID	PH NEUTRALIZATION
HIGH STRENGTH	CORN SWEETENER/FLAVORING
PH CAUSTIC	SANITATION

Locator: A50063 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH ACID	PH NEUTRALIZATION
HIGH STRENGTH	CORN SWEETENER/FLAVORING
PH CAUSTIC	SANITATION

Pioneer Industries
Customer Type: METAL FINISHING - CFR 433
Permit #: 7723-03 **Permit Status:** ACTIVE
Locator: A4328 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CHROMIUM	ANODIZING
PH CAUSTIC	ALUMINUM ETCH
PH ACID	SANITIZING

Precor Incorporated - Plant 1
Customer Type: METAL FINISHING - CFR 433
Permit #: 7787-01 **Permit Status:** ACTIVE
Locator: A30455 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CHROMIUM	PHOSPHATE LINE
PH ACID	PHOSPHATE LINE TANK 3
ZINC	PHOSPHATE LINE
NICKEL	PHOSPHATE LINE
COPPER	PHOSPHATE LINE
FOG NONPOLAR	PHOSPHATE LINE
CADMIUM	PHOSHATE LINE
LEAD	PHOSPHATE LINE

Precor Incorporated - Plant 2
Customer Type: METAL FINISHING - CFR 433
Permit #: 7716-03 **Permit Status:** ACTIVE
Locator: A33171 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CHROMIUM	PHOSPHATE LINE
COPPER	PHOSPHATE LINE
PH ACID	PHOSPHORIC ACID-SEALING
FOG NONPOLAR	PHOSPHATE LINE
ZINC	PHOSPHATE LINE
CADMIUM	PHOSPHATE LINE
NICKEL	PHOSPHATE LINE

LEAD	PHOSPHATE LINE
PH CAUSTIC	SODIUM HYDROXIDE-METAL CLEANER
PH CAUSTIC	SODA ASH-NEUTRALIZING AGENT

Rabanco Recycling Company
Customer Type: SOLID WASTE - TRANSFER FA
Permit #: 7595-04 **Permit Status:** ACTIVE
Locator: A43403 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	FACILITY WASHDOWN

Locator: A43406 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	FACILITY WASHDOWN

Ralph's Concrete Pumping
Customer Type: CEMENT/READYMIX
Permit #: 7795-01 **Permit Status:** ACTIVE
Locator: A51251 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
SOLIDS	CEMENT PUMP TRUCK CLEANING
PH CAUSTIC	CEMENT PUMP TRUCK CLEANING

Redhook Brewing Company
Customer Type: FOOD PROCESSING-BREWERY
Permit #: 7710-02 **Permit Status:** ACTIVE
Locator: A3075 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH ACID	ACID SANITIZER

Locator: A30751 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH ACID	ACID SANITIZER

Romac, Inc. - Bothell
Customer Type: METAL FINISHING - CFR 433
Permit #: 7730-03 **Permit Status:** ACTIVE
Locator: A20701 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CADMIUM	METAL FINISHING
CHROMIUM	METAL FINISHING
COPPER	METAL FINISHING
PH ACID	METAL FINISHING
ZINC	METAL FINISHING
NICKEL	METAL FINISHING
LEAD	METAL FINISHING

Locator: A20702 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ZINC	METAL FINISHING
COPPER	METAL FINISHING
CADMIUM	METAL FINISHING
LEAD	METAL FINISHING
PH ACID	METAL FINISHING
NICKEL	METAL FINISHING
CHROMIUM	METAL FINISHING

Salmon Bay Marine Center LLC (FKA Marco Shipyard)
Customer Type: BOAT/SHIPYARD
Permit #: 7819-01 **Permit Status:** ACTIVE
Locator: A43273 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	CONT STORMWATER
LEAD	CONTAMINATE SW
ZINC	CONTAMINATED SW

Seattle Barrel Company
Customer Type: BARREL CLEANING
Permit #: 7113-02 **Permit Status:** ACTIVE
Locator: A4089 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH CAUSTIC	DRUM CLEANING

Skills, Inc. - Ballard Facility
Customer Type: ELECTROPLATING - CFR 413
Permit #: 7552-02 **Permit Status:** ACTIVE
Locator: A1030 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CHROMIUM	ANODIZING
PH ACID	ANODIZING
COPPER	ANODIZING
ZINC	ANODIZING

Snohomish County Southwest Recycling and Transfer Station
Customer Type: SOLID WASTE - TRANSFER FA
Permit #: 7788-01 **Permit Status:** ACTIVE
Locator: A20821 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	LEACHATE
ORGANICS	LEACHATE
SOLIDS	LEACHATE

TOC Holdings Co. (formerly Time Oil Company)
Customer Type: FUEL - BULK STORAGE
Permit #: 7689-04 **Permit Status:** ACTIVE
Locator: A4257 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
FOG NONPOLAR	CONTAMINATED STORMWATER
ORGANICS	CONTAMINATED STORMWATER

Todd Pacific Shipyards Corporation
Customer Type: BOAT/SHIPYARD
Permit #: 7782-04 **Permit Status:** ACTIVE
Locator: A41022 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
COPPER	HYDROBLASTING/STORM
FOG NONPOLAR	BALLAST/BILGE
ZINC	HYDROBLASTING/STORM
LEAD	HYDROBLASTING/STORM
SOLIDS	HYDROBLASTING/STORM/CONCRETE FORMING

GASOLINE (BTEX)	GROUNDWATER REMED
PH CAUSTIC	CONCRETE FORMING

Locator: A41023 **Locator Type:** REGULATED

Pollutant Expected	**Process Generating Pollutant**
ZINC	HYDROBLASTING/STORM
PH CAUSTIC	CONCRETE FORMING
FOG NONPOLAR	BALLAST/BILGE
GASOLINE (BTEX)	GROUNDWATER REMED
COPPER	HYDROBLASTING/STORM
LEAD	HYDROBLASTING/STORM
SOLIDS	HYDROBLASTING/STORM/CONCRETE FORMING

Locator: A41024 **Locator Type:** REGULATED

Pollutant Expected	**Process Generating Pollutant**
COPPER	HYDROBLASTING/STORM
GASOLINE (BTEX)	GROUNDWATER REMED
SOLIDS	HYDROBLASTING/STORM/CONCRETE FORMING
LEAD	HYDROBLASTING/STORM
ZINC	HYDROBLASTING/STORM
PH CAUSTIC	CONCRETE FORMING
FOG NONPOLAR	BALLAST/BILGE

Locator: A41027 **Locator Type:** REGULATED

Pollutant Expected	**Process Generating Pollutant**
LEAD	HYDROBLASTING/STORM
ZINC	HYDROBLASTING/STORM
GASOLINE (BTEX)	GROUNDWATER REMED
COPPER	HYDROBLASTING/STORM
PH CAUSTIC	CONCRETE FORMING
SOLIDS	HYDROBLASTING/STORM/CONCRETE FORMING
FOG NONPOLAR	BALLAST/BILGE

Locator: A41028 **Locator Type:** REGULATED

Pollutant Expected	**Process Generating Pollutant**
PH CAUSTIC	CONCRETE FORMING
LEAD	HYDROBLASTING/STORM
GASOLINE (BTEX)	GROUNDWATER REMED
ZINC	HYDROBLASTING/STORM
COPPER	HYDROBLASTING/STORM
SOLIDS	HYDROBLASTING/STORM/CONCRETE FORMING
FOG NONPOLAR	BALLAST/BILGE

Locator: A41029 **Locator Type:** REGULATED

Pollutant Expected	**Process Generating Pollutant**
FOG NONPOLAR	BALLAST/BILGE
SOLIDS	HYDROBLASTING/STORM/CONCRETE FORMING
GASOLINE (BTEX)	GROUNDWATER REMED
PH CAUSTIC	CONCRETE FORMING
ZINC	HYDROBLASTING/STORM
COPPER	HYDROBLASTING/STORM
LEAD	HYDROBLASTING/STORM

Locator: A4102A **Locator Type:** REGULATED

Pollutant Expected	**Process Generating Pollutant**
FOG NONPOLAR	BALLAST/BILGE
PH CAUSTIC	CONCRETE FORMING
LEAD	HYDROBLASTING/STORM
COPPER	HYDROBLASTING/STORM
ZINC	HYDROBLASTING/STORM
SOLIDS	HYDROBLASTING/STORM/CONCRETE FORMING
GASOLINE (BTEX)	GROUNDWATER REMED

Universal Manufacturing
Customer Type: ELECTROPLATING - CFR 413
Permit #: 7236-02 **Permit Status:** ACTIVE
Locator: A3007 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
CYANIDE	ELECTRO
LEAD	ELECTROPLATING
NICKEL	ELECTROPLATING
POLYMERS	PRETREATMENT
PH ACID	ELECT/PRETREATMENT
PH CAUSTIC	PRETREATMENT
COPPER	ELCTROPLATING

Universal Sheet Metal, Inc.
Customer Type: METAL FINISHING - CFR 433
Permit #: 7525-03 **Permit Status:** ACTIVE
Locator: A3039 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
NICKEL	SAME
ZINC	SAME
COPPER	SAME
CHROMIUM	CHEM LINE RINSE WATER

University of Washington School of Dentistry
Customer Type: DENTAL OFFICE
Permit #: 7797-02 **Permit Status:** ACTIVE
Locator: A20841 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
SILVER	DENTAL/X-RAY
COPPER	DENTAL PROCEDURES
MERCURY	DENTAL PROCEDURES

Locator: A20842 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
SILVER	DENTAL/X-RAY
COPPER	DENTAL PROCEDURES
MERCURY	DENTAL PROCEDURES

Viox Corp.
Customer Type: GLASS MANUFACTURING
Permit #: 7507-03 **Permit Status:** ACTIVE
Locator: A4121 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
ZINC	GLASS PRODUCTION
PH ACID	GLASS PRODUCTION
LEAD	GLASS PRODUCTION
PH CAUSTIC	GLASS PRODUCTION

Washington Technology Center
Customer Type: METAL FINISHING - CFR 433
Permit #: 7800-01 **Permit Status:** ACTIVE
Locator: A2062 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant

PH ACID	ETCHING/CLEANING

WestFarm Foods/Darigold - Rainier
Customer Type: FOOD PROCESSING-DAIRY
Permit #: 7116-04 **Permit Status:** ACTIVE
Locator: A50311 **Locator Type:** REGULATED

Pollutant Expected	Process Generating Pollutant
PH ACID	CLEANING/SANITIZING
HIGH STRENGTH	DAIRY PROCESS
PH CAUSTIC	CLEANING/SANITIZING
FOG FLOATABLE	DAIRY PROCESS

APPENDIX J—STAKEHOLDER LIST

Hearing Attendee List

Public Hearing: King County West Point Draft NPDES Permit
Date: January 27, 2009, 7:30 p.m.

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APPENDIX K—WET TEST RESULTS

ACUTE TEST

For Acute toxicity, the performance standard is the median survuval in 100% effluent being equal to or greater than 80% and no individual test result showing less than 65% survival in 100% effluent.

West Point WWTP Acute WET Test Results as % Survival in 100% Effluent

Test Code	Collected	Start Date	Organism	Endpoint	% Survival
RMAR0922	4/13/07	4/13/07	*Daphnia pulex*	48-hour Survival	100%
RMAR0923	4/16/07	4/16/07	Fathead Minnow	96-hour Survival	100%
RMAR0965	7/13/07	7/13/07	*Daphnia pulex*	48-hour Survival	100%
RMAR0963	7/16/07	7/16/07	Fathead Minnow	96-hour Survival	**55%**
RMAR1042	10/12/07	10/12/07	*Daphnia pulex*	48-hour Survival	100%
RMAR1041	10/15/07	10/15/07	Fathead Minnow	96-hour Survival	100%
RMAR1146	1/11/08	1/11/08	*Daphnia pulex*	48-hour Survival	100%
RMAR1144	1/14/08	1/14/08	Fathead Minnow	96-hour Survival	93%
				Median =	**100%**

Median survival in 100% effluent = 100%. Since the fathead minnow acute test (sample RMAR0963 on 7/16/07) had less than 65% survival in 100% effluent, another effluent characterization for acute WET is required (WAC 173-245).

Total ammonia in sample RMAR0963 was 18.4 mg/L. Ammonia is the most likely cause of toxicity.

CHRONIC TEST

For Chronic toxicity, the performance standard is no chronic toxicity test demonstrating a statistically significant difference in response between the control and a test concentration equal to the acute critical effluent concentration (ACEC).

The ACEC is 3.1% effluent.

West Point WWTP Chronic WET Test Results as NOEC/LOEC in % Effluent

Test Code	Collected	Start Date	Organism	Endpoint	NOEC (%)	LOEC (%)
RMAR0921	4/11/07	4/11/07	Atlantic Mysid	7-day Survival	100	> 100
				Biomass	25	50
				Weight	25	50
RMAR0920	4/11/07	4/11/07	Topsmelt	7-day Survival	100	> 100
				Biomass	50	100
				Weight	50	100
RMAR1043	10/10/07	10/10/07	Topsmelt	7-day Survival	50	100
				Biomass	25	50
				Weight	25	50
RMAR1040	10/10/07	10/10/07	Atlantic Mysid	7-day Survival	50	100
				Biomass	12.5	25
				Weight	12.5	25
RMAR1147	1/9/08	1/9/08	Topsmelt	7-day Survival	100	> 100
				Biomass	50	100
				Weight	50	100
RMAR1145	1/9/08	1/9/08	Atlantic Mysid	7-day Survival	100	> 100
				Biomass	50	100
				Weight	50	100

If there is no chronic toxicity at the acute mixing zone boundary, then there is no reasonable potential for chronic toxicity at the edge of the chronic mixing zone boundary.

To review, Ecology compares the Lowest Observed Effects Concentration (LOEC) to the ACEC. If the LOEC is always above the ACEC, we can assume that there is no chronic toxicity. Based on the above data, the LOEC is always much greater than the ACEC (3.1 %

Therefore, no chronic WET limit is needed.